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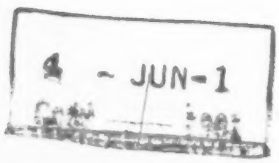

85TH CONGRESS
2d Session

SENATE

REPORT
No. 2501

CONTROL AND REDUCTION OF ARMAMENTS

FINAL REPORT

OF THE

COMMITTEE ON FOREIGN RELATIONS

SUBCOMMITTEE ON DISARMAMENT

PURSUANT TO

The Provisions of S. Res. 93, S. Res. 185, and S. Res. 286, 84th Congress, and S. Res. 61, S. Res. 151, S. Res. 192, and S. Res. 241, 85th Congress

OCTOBER 13, 1958.—Filed under authority of the order of the Senate of AUGUST 1, 1958

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[Created pursuant to S. Res. 93, S. Res. 185, and S. Res. 286, 84th Cong., and S. Res. 61, S. Res. 151, S. Res. 192, and S. Res. 241, 85th Cong.]

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PREFACE

By Senator Hubert H. Humphrey, Chairman

This is the final report of the Subcommittee on Disarmament which was created pursuant to the terms of Senate Resolution 93 (84th Cong.), as amended by Senate Resolution 185 and Senate Resolution 286 (84th Cong.), and Senate Resolution 61, Senate Resolution 151, Senate Resolution 192, and Senate Resolution 241 (85th Cong.). The Senate granted on August 1, 1958, permission for this report to be filed.

The Subcommittee on Disarmament was composed of members from three of the standing committees of the Senate: Foreign Relations, Armed Services, and the Joint Committee on Atomic Energy. This composition enabled the subcommittee as a whole to profit from the vast experience of the members in the three most important aspects of the problem of armaments reduction and control: foreign policy, atomic energy, and military defense. I wish to take this opportunity to thank the 11 Senators who served with me on this subcommittee. They were Senators Harry F. Byrd, John J. Sparkman, Russell B. Long, John O. Pastore, Stuart Symington, Styles Bridges, Alexander Wiley, Bourke B. Hickenlooper, Leverett Saltonstall, William F. Knowland, and John W. Bricker.

Each made a valuable contribution to the work of the subcommittee which culminated in the issuance of two unanimous reports containing conclusions and recommendations.

The subcommittee endeavored to carry out its work in an objective and impartial manner. We were also mindful of the public's need to have as much information as could be made available regarding the disarmament problem and proposed solutions of it.

Much of the subcommittee's work in recent months dealt with the question of the suspension of nuclear weapons tests with effective safeguards. Most of the relevant aspects of this matter were considered by the subcommittee through hearings, reports, staff studies, and correspondence with the executive branch. In its report of September 6, 1957, the subcommittee expressed the view that progress on disarmament "can come gradually, a step at a time" and that "it is a mistake to expect that the problem of disarmament can be solved in one sweeping overall agreement." The subcommittee also concluded that "if a first step disarmament agreement is to be realized it should be limited both as to the armaments being curtailed and as to the amount of inspection to be included * * * but * * * that each disarmament provision be susceptible to verification." Subsequently, on November 4, 1957, I wrote to the President regarding the need to make progress on a first-step disarmament agreement. In that letter I urged "that the United States, after consulting with its allies, declare its willingness to negotiate separately on a ban on nuclear weapons tests for a 2-year period with the only condition being agreement on an effective inspection system with United Nations supervision to insure that the ban is being scrupulously observed."

On a number of other occasions several of my colleagues and I urged the President to negotiate separately on a suspension of nuclear weapons tests and the inspection safeguards which should accompany any international agreement on this matter. Also on May 16, 1958, I wrote to the President and advocated that he pursue the acceptance by Premier Khrushchev of one of the President's proposals, namely, "to establish a scientific group to study the inspection system necessary to assure that a nuclear test suspension was being observed."

On August 22, 1958, following the successful conclusion of the Geneva talks between Soviet and western scientists on the control system for a suspension of tests, the President announced that the United States "is prepared to proceed promptly to negotiate an agreement with other nations which have tested nuclear weapons for the suspension of nuclear weapons tests and the actual establishment of an international control system * * *."

The President's statement is a welcome one and for the first time in 12 years of effort, there is in sight the prospect of a first-step agreement which deals with arms control.

The full texts of major correspondence of the subcommittee with the executive branch and congressional committees are appended to this document in appendix III. In addition, the subcommittee held 25 days of hearings, a list of which including dates and witnesses is given in appendix II. Annex I contains the texts of previous subcommittee reports and annex II contains the texts of the 10 staff studies issued by the subcommittee.

On behalf of the subcommittee I wish to thank the members of the staff for their assistance, those in the Legislative Reference Service of the Library of Congress who aided the subcommittee in the preparation of materials, and members of the staffs of the Committees on Foreign Relations, Armed Services, and the Joint Committee on Atomic Energy who advised the subcommittee regarding matters within their special areas of competence. I also wish to express appreciation to those executive agencies which cooperated with the subcommittee in the pursuit of its work.

A subcommittee composed of six members of the Foreign Relations Committee will continue the study of disarmament problems. As chairman of this newly constituted subcommittee, it is my hope and wish that the former members of the Senate Disarmament Subcommittee as well as other Members of Congress and our many fellow citizens throughout the country will continue to make known their views and advice on disarmament. As the subcommittee stated in its report of a year ago:

> If the United States is to continue to lead in the search for world peace; if we are to diminish the threat of a terrible third world war which hangs so heavily upon us and which requires us to sacrifice so much in the way of human and material resources; then we need the understanding, the inspiration, and the active concern of the American people in all walks of life.

This need is greater today than it was a year ago. Our efforts to achieve control and reduction of the weapons of war must be strengthened and must be continuous. In this way we will be able to go forward toward the goal of a just and peaceful world.

SEPTEMBER 3, 1958.

FOREWORD

The Committee on Foreign Relations transmits herewith to the Senate a report of the Subcommittee on Disarmament, created pursuant to the terms of Senate Resolutions 93, 185, and 286, 84th Congress, and Senate Resolutions 61, 151, 192, and 241, 85th Congress. Permission to file this report during the adjournment of the Congress was granted in the Senate on August 1, 1958.

This report is submitted to the Senate by Senator Hubert H. Humphrey, chairman of the subcommittee.

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CONTROL AND REDUCTION OF ARMAMENTS

OCTOBER 13, 1958.—Filed under authority of the order of the Senate of August 1, 1958, and ordered to be printed

Mr. HUMPHREY, from the Committee on Foreign Relations, submitted the following

REPORT

[Pursuant to S. Res. 93, S. Res. 185, and S. Res. 286, 84th Cong., and S. Res. 61, S. Res. 151, S. Res. 192 and S. Res. 241, 85th Cong.]

I. INTRODUCTION

The Senate Foreign Relations Subcommittee on Disarmament herewith submits a report on its findings and recommendations as of this date. A year ago the subcommittee issued a report stating its observations and conclusions as of that time (S. Rept. 1167, 85th Cong., 1st sess.). On this occasion the subcommittee adds to and supplements that report.

The subcommittee was created 3 years ago, on July 25, 1955, by Senate Resolution 93 of the 84th Congress, which directed it to make a "full and complete" study of the disarmament problem. Among the subjects the subcommittee was instructed to examine were: disarmament proposals of the major powers, as well as private citizens and groups; efforts of the United Nations in the area of arms control; the relationship of international tension to disarmament; the relationship of armaments to the world economy; methods by which the views of the American people on disarmament are communicated abroad; and methods to insure that reductions in armaments do not endanger our national security. The subcommittee has looked into these and other aspects of the problem through hearings in Washington and other cities, through the publication of staff studies, and through close observation of events in the disarmament field.

Senate Resolution 241, approved by the Senate in January 1958, authorized continuation of the subcommittee until July 31, 1958. In its report on this resolution the Senate Foreign Relations Committee concluded that—

> inasmuch as the question of armaments reduction and control is primarily a problem of foreign policy and a problem in-

> timately related to many other foreign policy matters, and in view further of the responsibilities of the Foreign Relations Committee over foreign policy matters, at the expiration of the Subcommittee on Disarmament, on July 31, 1958, all records, duties and functions of the subcommittee should be turned over to the Committee on Foreign Relations.

The report also pointed out that—

> The Foreign Relations Committee, bearing in mind that disarmament must be a matter of continuing concern, contemplates the creation at that time of an appropriate subcommittee or other suitable device so that the responsibilities of the committee to the Senate and the American people will continue to be fulfilled.

This subcommittee is pleased to note that the Foreign Relations Committee on July 15, 1958, decided to establish a Subcommittee on Disarmament consisting of six members of the Foreign Relations Committee chosen equally from both parties by the chairman. The creation of this subcommittee will enable legislative interest in and work on the problem of disarmament to be maintained. This subcommittee, however, advises that although it agrees that disarmament is primarily a foreign policy question, nevertheless, it has important links with military strategy and defense and with atomic energy matters. It is the recommendation of this subcommittee, therefore, that these aspects of the control and reduction of armaments should be given due weight in deciding issues relating to the disarmament question. It is suggested, furthermore, that the Foreign Relations Committee may wish from time to time to utilize the special experience and knowledge of members of the Joint Atomic Energy Committee and the Armed Services Committee who have been privileged to serve on the subcommittee now being discontinued.

In its report issued last September the subcommittee reviewed the problem of disarmament. It discussed the need for disarmament, the general nature of a disarmament agreement, the relationship of disarmament to international tension and to national security, the formulation and organization of United States disarmament policy, and economic aspects of arms control. The report stated conclusions and advanced recommendations as to policies that should be adopted and steps that should be taken in order to progress toward a solution of the disarmament problem. It would be repetitious for the subcommittee to cover the same ground again. It will therefore confine itself in this report to supplementing its previous conclusions and recommendations as it feels warranted by the results of its work over the past year.

RECENT DEVELOPMENTS IN DISARMAMENT

Within a matter of weeks after the subcommittee's last report new signs appeared in the skies warning of the necessity of making rapid progress on disarmament. History's first launchings of space satellites by the Soviet Union and the United States gave a new dimension to the disarmament question. They not only extended the bounds of the disarmament problem to the reaches of outer space but also imposed a new urgency on the quest for control of all forms of arma-

ments. It is serious enough to have a gigantic arms race going on between the two largest power blocs on earth. To extend this race for military supremacy to outer space could become exceedingly grave. The subcommittee stresses once again that it is absolutely vital to make headway toward checking the arms race lest the forward sweep of military technology create insurmountable obstacles in achieving practical and reliable weapons control.

International disarmament negotiations since the fall of 1957 have given cause for both pessimism and optimism. The rejection by the Soviet Union of the resolutions on disarmament approved by the 12th session of the General Assembly, and the Soviet boycott of the U. N. Disarmament Commission, which had been designated by the General Assembly of the United Nations as the appropriate forum for conducting negotiations on the regulation of armaments, have been serious obstacles to progress. The United Nations, according to its charter, has certain responsibilities in the disarmament field. For a dozen years the nations of the world have acknowledged the suitability of the United Nations as a center where the governments of the world should carry on their negotiations to limit armed forces and armaments. Despite the recalcitrance of the Soviet Union the United States should continue to work for the resumption of disarmament talks within the framework of the United Nations. By such action, this country would be responding to its commitments under the charter and it would be manifesting its respect for the opinion of mankind which finds expression on a worldwide scale in the international organization.

On the credit side of the ledger since last fall has been the successful conclusion of technical discussions among scientists from the Soviet bloc and the Western powers on the question of inspection for an international suspension of nuclear weapons tests.[1] These talks laid the groundwork for further talks, on a political level, concerning an agreement to suspend nuclear tests. In addition, the Soviet Union has given an affirmative response to the United States proposal for technical discussions on the question of inspection for surprise attack.

II. Disarmament and Political Settlements

Although the subcommittee does not believe that a start on disarmament should await the settlement of outstanding political issues between the Communist bloc and the Western Powers, it perceives the link that exists between the resolution of important political problems and a large-scale reduction of armaments. In its last report the subcommittee singled out two political problems as deserving of special attention as impediments to substantial arms control—the problem of German reunification and the problem of China. Regretfully the subcommittee must report that both of these problems are still unresolved.

EUROPEAN SECURITY AND THE DIVISION OF GERMANY

The problem of German reunification is intimately linked with the question of European security and with the question of a reduction

[1] See pp. 8–12 for subcommittee comments on these technical discussions.

of armed forces and armaments in the European area. The subcommittee pointed out in its previous report:

> The achievement of a free and reunified Germany would probably involve some ceiling on the size of its armed forces and its supply of armaments. Such restrictions to be binding, however, must be accompanied by similar restrictions on the armed forces and armaments of other nations in Europe as well as the United States and the Soviet Union. These restrictions should apply to the European NATO countries and the Warsaw Pact countries of Eastern Europe, and would involve relocation and possible reduction of Soviet forces in Eastern Europe and United States forces in Germany.
>
> If United States forces were to be withdrawn from Germany provision would need to be made for stationing them elsewhere on the eastern side of the Atlantic so long as NATO military strategy requires it.
>
> Restrictions on armed forces and armaments would involve the establishment of an adequate inspection and control system to insure not only that a surprise attack could not take place but also that the restrictions agreed upon were being observed.
>
> New security arrangements such as an all-European security treaty based on limited disarmament measures and a united Germany must presuppose no diminution of the military strength of NATO in Western Europe relative to the military strength of the Warsaw Pact powers.
>
> The subcommittee realizes it will be difficult to translate these principles into specific proposals to which all the countries involved could subscribe. Nevertheless, if German reunification is to become more than a slogan, western policy must be both persistent and realistic. Neither the Western Powers' nor Soviet policy on German unification appears to be sufficiently flexible to encourage progress toward the solution of this problem.

Since these words were written, the United States, the United Kingdom, France, and the U. S. S. R., have discussed the problem of Germany and European security through various exchanges of notes and through memoranda submitted by the governments concerned preparatory to the holding of a summit conference among the major powers. A careful analysis of these notes and memoranda suggests that both sides may be displaying somewhat greater flexibility in their approaches toward the solution of this problem. No actual negotiations, however, have taken place so it is not possible to report that any progress has been made. The subcommittee can only reiterate its previous conclusions and recommendations cited above as ones which appear to offer a reasonable basis for a settlement of the division of Germany and a European security system with reduced emphasis on the deterrent capability of two highly armed camps. Although all of the above steps would, if taken, place European security on a firmer foundation, it may be necessary and desirable to work for the achievement of some steps without waiting for the realization of all of them. For example, steps to decrease the possibilities of a surprise attack on Western Europe might reduce tension in the area sufficiently

to permit other arms control measures and steps for the settlement of the division of Germany to be taken subsequently.

The subcommittee also warns that unless some progress is made on modifying the foundations of European security, there will soon exist military forces on both sides equipped with many types of nuclear weapons and with long-range missiles at their disposal. It is difficult to see how this trend, if it persists, can increase the security of the United States and its NATO allies, or for that matter the security of the Soviet Union and the enslaved people of Eastern Europe.

CHINA

In its previous report the subcommittee stated that:

> Before substantial steps can be taken to reduce armaments in Asia, the Chinese Communist Government must demonstrate an intent to live in peace with other nations.

The subcommittee has surveyed major developments and activities of the Chinese Communist Government over the past year with respect to its relations with other nations. This review revealed the following: The number of American prisoners held by China has been reduced from 6 to 4. (The detention in China of Americans for no just cause has been a major obstacle to the reduction of tension between the United States and the Chinese Communist regime.) The Chinese Communists have announced that they are withdrawing their troops from North Korea and that they would be willing to hold elections throughout Korea to permit unification, provided that the United States withdrew its troops from South Korea first. But they have not accepted United Nations sponsorship for such elections. They have taken a hard line toward independent Communist actions in Yugoslavia, Hungary, and Poland which indicate that the slogan advanced by Mao Tse-tung, "Let 100 flowers bloom," was more of a lure to smoke out critics and advocates of a mild form of free speech than what it first appeared; that is, an effort to allow individual Communist nations to devise their own systems of economic and political organization and to allow some freedom of expression within Communist societies. Peiping has made overtures of trade with a number of countries. However, it broke off all trade relations with Japan primarily because the latter insisted on maintaining friendly relations with the Republic of China.

In recent weeks, the Chinese Communists have disrupted the peace of the area through their large-scale bombings of off-shore islands held by the Republic of China and through declarations of their intent to launch an invasion to win control over them.

Communist China is still a formidable military power and every indication is that this power is being augmented. As the subcommittee has evaluated events in the area of China and within China itself which are directly related to disarmament, it has concluded that there is a real possibility that the exclusion of China from a first step disarmament agreement might provide the Soviet Union a significant loophole through which to evade such an agreement. Obviously, whether this loophole would exist would depend on the nature of the agreement. The subcommittee notes in this connection that an

agreement which involved the suspension of nuclear weapons tests with inspection and which did not include inspection in Communist China might present an opportunity for evasions on the part of the Soviet bloc. The United States must not contemplate signing a disarmament agreement which would permit its security to be jeopardized. The subcommittee is of the opinion, therefore, that greater attention must be paid to the question of including Communist China in any disarmament agreement which would provide for the suspension of nuclear weapons tests with inspection.

To include Communist China might introduce some complex political considerations in United States foreign policy. For example, it is questionable whether Communist China would permit control posts and inspection inside its territory without becoming a party to the agreement. The Soviet Union itself might insist that Communist China be included, since there is no positive assurance that Communist China and the Soviet Union will always be on friendly terms. The United States must begin to recognize that such complications may occur.

III. Limited Arms Control Measures and International Tension

The subcommittee concluded in its last report that the United States should work for the removal of international tension in certain areas: (1) through encouraging the settlement of political disputes by peaceful means including the extension of international law; (2) through the application of limited arms control measures which have been successful in the past, i. e., the creation of demilitarized zones in certain areas where armed conflict has taken place and the use of an international police force where a patrol, inspecting, and separating agency is necessary; and (3) through greater attention in the United Nations regarding the extent to which the trade and supply of armaments by the major powers foster an armaments race and create tension among the smaller and less industrialized nations.

The subcommittee again stresses the need for continuing and increased study and action on these matters where appropriate. In particular the subcommittee records its keen disappointment that nothing has been done to implement the resolution (S. Res. 15) approved by the Senate on August 8, 1957, which favored the creation of a permanent Uuited Nations peace force.[2] The United States should press in the United Nations for a decision on this matter. The force should be large enough to cope with situations that are likely to arise, such as in the Middle East and North Africa. It should be under the direction of the United Nations and financially supported on a continuing basis, if possible, as a regular expenditure of the United Nations budget. The subcommittee realizes that obtaining the necessary revenue is one of the biggest practical obstacles to creation of the permanent peace contingent and it urges that the United Nations give priority study to means of augmenting revenue for this purpose. In the

[2] On July 23, 1958, the Senate passed an identical resolution (S. Con. Res. 109) calling for the establishment of a United Nations force. The final form of this resolution, as amended by the House of Representatives on August 21 and concurred in by the Senate on August 22, suggested immediate consideration by the United Nations General Assembly of "the development, within its permanent structure, of such organization and procedures as will enable the United Nations promptly to employ suitable United Nations forces for such purposes as observation and patrol in situations that threaten international peace and security."

beginning at least, manpower for the force should be drawn from nations which are not permanent members of the Security Council. The usefulness of the force will be enhanced if its composition does not reflect or intensify clashes of interest among the great military powers.

The subcommittee also firmly believes that experience has shown the efficacy under certain circumstances of the device of a demilitarized or internationalized zone along a sensitive frontier, particularly if such a zone is patrolled by an international peace force. It urges that the United States give support to the creation of such zones in appropriate cases where frontiers are subject to violation by illegal arms traffic or by hostile armed personnel.

The problem of the international clandestine arms trade has become very acute within the past year, particularly in the Middle East. The subcommittee recalls that in its last report it recommended that more attention should be paid in the United Nations to the extent to which the armaments supply contributes to international tension. The subcommittee notes with deep concern that the United Nations has not taken any action on this problem. The resolutions on disarmament approved by the last General Assembly ignored the problem of the arms trade and the Assembly failed to inaugurate any study or exploration of the problem. The subcommittee urges that the United States sponsor in the next session of the General Assembly a proposal to study and recommend practical measures regarding the international arms trade.

IV. Suspension of Nuclear Weapons Tests

During the past several months the subcommittee concentrated on the question of whether it would be in the national interest of the United States to seek to negotiate an international agreement for the suspension of nuclear weapons tests, provided that agreement could also be reached on an effective and reliable inspection system to assure to the greatest degree possible that secret evasions of the agreement could not take place. In its deliberations the subcommittee considered the following aspects of the problem: (1) the importance of pursuing certain disarmament measures in relation to others; (2) defense and security requirements of the United States and countries allied with us; (3) the requirements of an inspection system; and (4) the position of other countries on this question.

CONCEPT OF THE PACKAGE AGREEMENT

During 1957 the United States worked out with Great Britain, France, and Canada (the three other Western Powers on the subcommittee of the United Nations Disarmament Commission) a proposal for a disarmament agreement which consisted of the following measures: (1) prevention of surprise attack through aerial and ground inspection in specific zones; (2) suspension of nuclear weapons tests with inspection safeguards; (3) prohibition of the production of fissionable materials for weapons purposes with inspection; (4) a beginning on the transfer of fissionable material from weapons stocks to peaceful purposes; (5) a small reduction of the armed forces of the major

powers; (6) the transfer of selected armaments from national military establishments to international depots; (7) restrictions on the transfer of nuclear weapons to other countries; (8) the creation of a committee to study ways to insure that objects sent into outer space will be used exclusively for peaceful and scientific purposes; and (9) a study by an international agency of the control of the export and importation of armaments.

All of the countries which ratified the North Atlantic Treaty endorsed the above proposals which were presented as a package plan to the Soviet Union during the disarmament negotiations at London throughout the spring and summer of 1957. Unfortunately, the Soviet Union preferred at that time to close off the negotiations and instead embark on a propaganda campaign in the regular fall session of the United Nations General Assembly. This tactic failed miserably and the General Assembly voted approval of the western proposals by a vote of 56 to 9 with 15 abstentions.

Subsequently, the United States acted to indicate that the concept of a disarmament package was not sacrosanct. Early in 1958 in letters to the Premier of the Soviet Union the President of the United States proposed [3] that procedures be devised to insure that objects sent into outer space would be used solely for peaceful purposes. This is essentially point 8 above and an indication that the executive branch was prepared to negotiate separately on this step which had previously been linked to the package.

In addition, on April 29, 1958, the United States proposed in the United Nations Security Council that inspection be installed in the Arctic region to guard against surprise attack. This proposal was part of point 1 above. The Soviet Union vetoed this offer of the United States on May 2, 1958, but on July 3 in a note from Premier Khrushchev to President Eisenhower the former admitted in general the need to discuss the technical requirements for the prevention of surprise attack.

The most recent move in the direction of breaking up the package was the proposal of President Eisenhower on August 22, 1958, following the Geneva technical talks, that an agreement for the suspension of nuclear weapons tests be negotiated. The only link such an agreement would have to other disarmament steps would be the requirement that a review of events at the beginning of every year show that "satisfactory progress is being made in reaching agreement on and implementing major and substantial arms control measures such as the United States has long sought."

The subcommittee concurs that steps in the comprehensive disarmament package can be separated with the view to achieving a limited first step disarmament agreement and in order to make some headway toward curbing the armaments race.[4]

SUSPENSION OF NUCLEAR TESTS AND DEFENSE

The subcommittee sought to learn from witnesses of the executive branch how the United States atomic weapons program compared in general with what is known about the atomic weapons program of the

[3] Letters dated January 12, 1958, and February 15, 1958. Previously, on October 10, 1957, the United States announced in the United Nations General Assembly its willingness to proceed with the formation of a technical committee for outer space control without awaiting prior agreement on other disarmament measures.

[4] See similar conclusion and discussion of this point in the subcommittee's report of September 6, 1957, Report No. 1167, 85th Cong., 1st sess., p. 13.

Soviet Union. The authoritative witnesses who testified before the subcommittee [5] voiced assertions or opinions that the United States is ahead of the U. S. S. R. in this phase of the current United States-U. S. S. R. armaments race.

However, some of these witnesses [6] indicated that since the United States could only be in the position of defending against aggression and never in the position of being an aggressor, that, therefore, the United States arsenal of atomic weapons must be much more sophisticated and refined than now is the case. These witnesses particularly feel the need for the continued development of weapons with reduced radioactive fallout and atomic weapons of small yields which can be used in limited warfare situations. Other witnesses testified that the atomic weapons arsenal of the United States was already diversified and efficient and that it was to our interest to stop now while we are ahead.[7]

The subcommittee did not go into detail regarding the various military needs of the United States. In many cases this is the responsibility of other committees but the subcommittee has had available to it testimony presented before other committees. The subcommittee notes that discussion of such concepts as massive and selective retaliation and limited nuclear war or limited conventional war are necessarily theoretical and hypothetical. Obviously the United States must try to be prepared for many kinds of emergencies, not the least of which are those emergencies which must include the use of military force. At the same time the main elements of United States foreign policy must not be designed primarily for a large variety of possible military circumstances to the exclusion of key political factors. Of the cases of conflict and strife during the past year—for example civil disorder in Lebanon, the military coup in Iraq, rebellion in Algeria, exchange of gunfire between French and Tunisian forces in Tunisia, civil war in Indonesia and strife in Cyprus—there was not one in which the use of tactical nuclear weapons appeared warranted or feasible. Therefore, the subcommittee warns that undue reliance on military measures may diminish the ability of the United States to pursue the use of various political and economic measures as means toward the goal of a just and peaceful world.

REQUIREMENTS OF AN INSPECTION SYSTEM FOR THE SUSPENSION OF NUCLEAR WEAPONS TESTS

The subcommittee wishes to emphasize that any agreement to suspend nuclear weapons tests should not be based on trusting the word of the signatories. Rather, it must be based on an inspection and control system that is sufficiently trustworthy. Witnesses before the subcommittee have endorsed this principle. For example, Adm. Arthur W. Radford, former Chairman of the Joint Chiefs of Staff, testified before the subcommittee "that the element of trust would be eliminated by a proper control system." [8] The United States has been

[5] See subcommittee hearings, testimony of Dr. Willard F. Libby, pp. 1375 and 1381; Gen. Alfred D. Starbird, p. 1396; Dr. Hans Bethe, p. 1543; Adm. Lewis Strauss, pp. 1557–1558; and Dr. Edward Teller, p. 1463.
[6] Ibid., Admiral Strauss, p. 1550; General Starbird, pp. 1392–1393; 1402; and Dr. Edward Teller, pp. 460–1462.
[7] Subcommittee hearings, testimony of Dr. Hans Bethe, p. 1543, and Mr. Harold Stassen, pp. 1362–1363.
[8] Hearings of the subcommittee, pt. 4, March 5, 1956, p. 174.

wise in taking the position that any disarmament step, including the suspension of nuclear weapons tests, must be subject to verification by inspection measures. The Soviet Union, however, has previously ignored the need for inspection and has called only for a suspension of nuclear weapons tests. The subcommittee welcomed, therefore, the acceptance by Premier Khrushchev of President Eisenhower's proposal for a technical conference to study the possibility of detecting violations of a possible agreement on the suspension of nuclear weapons tests.

It is highly significant that after 8 weeks of discussion the 2 teams of scientific experts in Geneva have reached agreement. These two teams, one composed of western scientists and one composed of scientists from the Soviet bloc, have adopted conclusions regarding the methods of detecting tests and conclusions regarding a control system with certain capabilities and limitations to detect and identify nuclear explosions including low yield tests, i. e., 1 to 5 kilotons.

The successful conclusion of the Geneva talks is a reflection of thoughtful preparations undertaken by the executive branch during the preceding months. In its last report the subcommittee urged the executive branch to devote greater attention and effort to inspection plans for various disarmament measures. Such plans were subsequently prepared for the control of a suspension of tests and were utilized by western scientists at the conference of experts at Geneva.

In regard to inspection to verify an agreement to suspend nuclear tests, the subcommittee itself spent considerable time studying the means by which such an agreement could be verified.[9] The subcommittee attempted to determine the various requirements of an inspection and control system. The study that was done indicated that the possibilities for effective and adequate inspection for the suspension of tests are considerable.

The main problem in connection with verification of any agreement is distinguishing explosions from natural events, i. e., earthquakes, lightning, and so forth. Detection instruments may not always be able to distinguish between these natural events and explosions, in which case investigation of the event by on-the-spot inspection would be required. However, with the combination of detection instruments and devices, described further in the next section, and on-the-spot inspection, a potential violator of an agreement could never be sure he would not be caught.

POSITION OF OTHER COUNTRIES ON SUSPENSION OF NUCLEAR TESTS

The subcommittee does not know of any country that opposes an international agreement on the suspension of nuclear tests, provided the agreement includes provisions for adequate inspection to assure control. Differences of view exist, however, on the relation of the suspension of tests to other disarmament measures and on how much inspection would be needed.

It is important to note that at least 1 country, in addition to the 3 that already have a nuclear capability, has indicated its current intent to manufacture nuclear weapons. Other countries might also decide to follow a similar course in the not too distant future. To

[9] See, e. g., the subcommittee's hearings, pts. 14, 15, 16, and 17. See also Subcommittee Staff Study No. 10: Detection of and Inspection for Underground Nuclear Explosions.

achieve a nuclear arms capability would involve considerable testing. Any nation has the right to want to augment its defense capabilities by producing atomic weapons. The subcommittee, believes, however, that virtually all free world governments would like to contribute positively to a reduction of international tension if an agreement involving a ban on nuclear weapons testing should be concluded. But it is the prerogative of each sovereign country to decide what its course will be. Similarly, although the United States should consult with other powers, we must decide ourselves what it is in our best interest to do.

CONCLUSIONS OF THE SUBCOMMITTEE

In view of the foregoing considerations, the Subcommittee on Disarmament concludes that it would be in the interest of the overall objectives of United States policy to seek an international agreement on the suspension of nuclear tests, provided that effective and reliable inspection and control can be installed in all necessary places.

In reaching this conclusion the subcommittee is aware that an agreement to suspend tests would not in itself substantially curb the armaments race and bring about world peace. In fact, there is the danger that any agreement regarding the control of armaments would be interpreted as being more than it is and could result in a false sense of security. In view of this the subcommittee believes that any agreement to suspend nuclear tests should be regarded as but a first step toward the goal of more comprehensive measures for the control and reduction of armaments.

V. Inspection as Part of a Disarmament Agreement

As stated previously, the subcommittee agrees that the United States should enter into a disarmament agreement only if there is assurance to the greatest extent possible that it cannot be secretly violated by any signatory. It is not reasonable to expect nations to rely on the good faith of the parties for assurance that an arms control agreement is being observed. Such reliance could be misplaced and could result in hastening the war we are seeking to avoid.

The subcommittee in its report last year mentioned several methods of ascertaining whether a disarmament agreement was being carried out—through the usual channels of intelligence, through treaty provisions of such a nature that their nonobservance would be self-evident, or by an international inspection system.

Of the various methods, the most effective would seem to be international inspection. This is not to suggest that the subcommittee opposes the use of the other methods. Certainly general intelligence activities should be used as a supplementary device to determine compliance of any disarmament agreement. And obviously the withdrawal of Soviet troops from Austria—a measure the fulfillment of which was self-evident—was a welcome move which did not require inspection. But on such measures as the suspension of nuclear tests, the cutoff of fissionable material production for weapons purposes, and the prevention of surprise attack, inspection is essential.

Inspection is here used to mean observation by instrument and/or in person by inspectors charged with the duty of reporting any suspicious activity indicating violation of the agreement to all its

parties. Inspection must be adequate and effective; that is, the inspection organization must have the authority and capability of carrying out its assigned task with no undue risk of failure.

INSPECTION OF A SUSPENSION OF NUCLEAR-WEAPONS TESTS

Inspection instruments

To control a suspension of nuclear-weapons tests, the following four types of instrumentation would be necessary to detect and identify nuclear tests below the surface, on the surface and in the lower atmosphere above the earth: (1) instruments to detect acoustic and hydroacoustic (sound) waves; (2) instruments to detect electromagnetic (light and radio) waves; (3) instruments to gather radioactive debris; and (4) instruments to detect seismic (underground) waves.

For detection of high-altitude tests, optical instruments and other radio techniques would very probably have to be utilized to supplement the above instruments. It is also possible that satellites equipped for reconnaissance or other purposes could be orbited as inspection devices.

Acoustic, electromagnetic, and seismic detection instruments would normally be employed at fixed points. Radioactive detection apparatus is sometimes located in fixed stations, and often it is airborne in order to sample debris floating in the atmosphere. To supplement these detection methods mobile inspection teams might be necessary to inspect the site of a possible explosion. These teams would require additional instruments such as Geiger counters and boring machinery.

Efficacy of an inspection network for a test moratorium

The real test of an inspection system is whether it can do the job assigned to it. Since the national security of the participants would be at stake if one of them could secretly develop new atomic weapons by testing while the others adhered to the agreement, it is a critical question whether an inspection system for a test ban could be made sufficiently reliable to insure that nuclear tests would not be conducted secretly. This question must be examined both from a technological and political viewpoint.

From testimony submitted to it the subcommittee believes at this time it is technologically practicable to devise an inspection system that could reliably detect and identify the two categories of nuclear tests that up to the present have been most prevalent: those on the surface of the ground, and those in the lower atmosphere. In regard to high altitude tests—in the upper atmosphere or in outer space—the subcommittee notes that while it is fully expected that these could be reliably inspected, this expectation still rests primarily on theoretical calculations. The subcommittee hopes that concrete substantiating data can be made available in the near future.

Differences of opinion exist regarding the detection and identification of underground tests, particularly those in the lower kiloton range.[10] In regard to small underground nuclear tests, there is a correlation between the number of control stations and the extent

[10] See, e. g., testimony of Dr. Hans Bethe and Dr. Edward Teller in subcommittee hearings, pt. 17, pp 1455 ff. and 1526 ff. See also staff study No. 10, op. cit.

to which a nuclear test ban could be effectively inspected. The larger the number of stations and the closer they are together the smaller the size of nuclear test explosions that could be detected. But if the number of stations should be limited, then the likelihood of confusing earthquakes with underground explosions would increase and the chance that a test explosion might go undetected would be greater.

At the present time it appears it will be necessary to have mobile inspection teams to investigate doubtful cases. In practice there is a relationship between the number of doubtful cases and the practicality of using inspection teams. The fewer the number of doubtful cases the more practical it will be for inspection teams to investigate them.

The reliability of an inspection system from a political standpoint is a matter of judgment. So long as a country knows that there is a very great probability it will be caught if it tries to cheat on an agreement, it must then run a risk in sneaking an illegitimate test explosion. The cost of "getting caught in the act" is the termination of the agreement, the acceleration of the arms race, the proliferation of nuclear-weapons manufacture to many countries and further evidence to all the peoples of the world that the violator is not willing to abide by an agreement designed to reduce the threat and danger of a devastating nuclear war.

The risk of entering into a disarmament agreement should be weighed against the risk of not entering it. The risks resulting from continuation of an armaments race based on mutual endeavors to pile up increasingly destructive weapons and on the inevitable spread of modern weapons know-how to other countries must be balanced against the risk of entering into limited arms control agreements which provide for effective inspection.

INSPECTION OF A TERMINATION OF NUCLEAR PRODUCTION FOR WEAPONS PURPOSES

The subcommittee has received testimony from the United States Atomic Energy Commission indicating that it would be possible (although it would be difficult and involve access to information and installations now considered secret) to establish an inspection system over atomic production to insure that no significant amount could be diverted for forbidden weapons purposes.[11] However, the subcommittee did not study this matter in sufficient detail to warrant any general conclusions other than to state that if such inspection is in fact so difficult and far reaching, the inclusion of this proposal as an essential ingredient of a first step disarmament agreement might create an insurmountable obstacle to any progress toward armaments control.

The subcommittee has not given thorough study regarding the efficiency of devices and methods that could be applied in inspecting other forms of disarmament, such as for a limitation on conventional arms or for control of space weapons.

[11] See testimony of Dr. Spofford G. English and Mr. Lewis Strauss in subcommittee hearings, pt. 16, pp. 1405 ff. and pt. 17, pp. 1554–1555.

VI. Prevention of Surprise Attack

One form of disarmament that could provide a valuable step toward a more comprehensive system of arms regulation would be the creation of an inspection network to prevent surprise attack. One of the most salient characteristics of modern warfare is its lightning swiftness. Not only have bombs and warheads become massively destructive, but the methods of delivering them have so gained in speed that nations might be severely devastated or destroyed in a matter of hours. Fear of surprise attack has added measurably to international tension.

If fear of surprise attack could be allayed through an inspection system that could warn of impending aggression or through controls over such rapid means of delivery as long-range missiles, this would be a vital contribution to peace. Without the element of surprise, aggressive attack by one great power against another under conditions of modern warfare becomes difficult, if not impossible. The institution therefore of inspection systems to cover whole countries or merely localized areas could make an auspicious opening in the cloud of distrust now darkening relations among nations.

The subcommittee urges that the United States keep pressing for agreement with the Soviet Union on proposals for inspection against surprise attack. The subcommittee believes that the convening of a joint technical conference for the purpose of working out technical aspects of inspection against surprise attack could be an appropriate first step toward conclusion of an agreement on this subject.

Although the subcommittee would prefer that an inspection arrangement to warn of surprise attack cover all the geographic areas from which such an attack might originate, with a complete aerial and ground inspection network, nevertheless it recognizes that it might be well to start off with a limited area and limited inspection devices.

Control over modern military delivery systems, such as long-range missiles, is related to the whole problem of regulating space weapons and other space vehicles.

VII. Arms Control in the Space Age

Since the date of the last subcommittee's report on its recommendations and activities, the world has entered into a new age—the age of space. The impact of this new era on our lives and on future generations can scarcely be measured adequately at this early date. But one way in which the space age has already begun to affect our lives has become evident. It is obvious that space vehicles, satellites and other objects have tremendous military potential. Any comprehensive system of arms control could not be complete without taking space weapons into account.

Already formidable space weapons exist in the form of long-range missiles that can hurtle through space and in a matter of minutes deliver nuclear warheads of vast destructive effect upon targets thousands of miles away. They have added a whole new dimension to the destructive violence of the atom. Other varieties of military space devices are on drawing boards or have entered a stage of pro-

duction. Control of missiles and of other space engines of destruction is of an urgency comparable with that for the control of nuclear weapons. It is for this reason that the subcommittee regrets that no action has been taken by the major powers, in concert, to bring them under a check-rein.

Within this field the subcommittee recommends that the United States take energetic action to attain the goals set forth below. To the greatest extent possible, these goals should be sought within the compass of the United Nations Charter. The forthcoming session of the U. N. General Assembly in the fall should offer a favorable occasion for initiating action.

1. *The outlawing of any use of space for military purposes.*—The General Assembly at its last session approved a general disarmament resolution containing a provision for a joint study of an inspection system designed to insure that the sending of objects through outer space will be exclusively for peaceful and scientific purposes. The subcommittee urges that the executive branch work to see this resolution implemented so that a study commission will be established by the General Assembly, with directions to make a report at an early date. This would move the world closer toward the goal of restricting the use of outer space to peaceful purposes.

2. *International cooperation for peaceful space exploration and development.*—Under the auspices of the International Geophysical Year the nations of the world are already cooperating to a limited extent for peaceful, scientific study and exploration of space. This cooperation should now be carried onto a higher plane through a formal international organization providing for intergovernmental action under the United Nations. Peaceful cooperation of this nature would have positive value as a means of diverting resources and energies that might otherwise be available for military space projects. One of the first projects should be the development of a reconnaissance satellite to assist in carrying out arms control measures.

3. *Agreement by all nations not to make any national claim to any extraterrestrial body or area of outer space.*—Adoption of such a principle now is practically a necessity for the success of any future plan of disarmament in space. It is only thus that conflicting claims in outer space can be avoided and the erection of spheres of armed influence can be prevented. Inasmuch as lunar probes, which could lay the groundwork for national claims to the moon, are already being attempted, the development of space law and the adoption of a principle of internationalization of space are matters of urgency.

VIII. Formation and Organization of Disarmament Policy

Important changes in the executive organization for disarmament have occurred since the subcommittee's last report. The Office of the Special Assistant to the President for Disarmament has been terminated. Political aspects of disarmament policy formulation have now been absorbed into the State Department. There is, as a result, less chance that the United States will appear abroad as speaking with two, and sometimes conflicting, voices on disarmament questions.

The subcommittee previously urged that there should be an adequate staff of competent personnel for disarmament and that sufficient funds should be made available for this purpose. While the personnel attached to the disarmament office is able and devoted, it is far from adequate. There are only some 6 or 7 persons who work full time on disarmament in the State Department. The subcommittee is struck by the disparity in the effort the world is putting into thought and action for controlling and reducing armaments and the effort going into the development, fabrication and buildup of armaments. It strongly urges the executive branch to take action to remedy this situation. In this respect the subcommittee is disappointed that the State Department has not seen fit to create, as recommended previously by the subcommittee, special advisory groups of nongovernmental experts to explore specific aspects of the disarmament problem. The subcommittee believes that study groups of this type could make a valuable contribution to national disarmament policy. Although the subcommittee is pleased to note that the Secretary of State has constituted four outstanding American statesmen into an advisory body on disarmament matters,[12] it does not consider that this body satisfies its recommendation pointed out above. A good example of the type of group necessary to study specific disarmament problems is the special panel on the technical aspects of inspection of the President's Scientific Advisory Committee. The work of this panel, which deserves special commendation, points up the continuing necessity of having a competent group of experts in technical and scientific subjects available on a permanent basis to analyze the technical aspects of disarmament and to make recommendations thereon to political officials. The subcommittee regrets, however, that the report prepared by this group has been withheld from the public. The subcommittee previously cautioned that the executive branch should keep in mind the public's need to know what our policy is and the reasoning and facts which might go into the formulation of disarmament policy. Many of the facts in regard to disarmament are of such a nature that they can be supplied or can best be supplied only by the executive branch. While national security requires that some data should be classified, this requirement should be construed so that the maximum amount of information can be given to the public. Every precaution should be taken that information given out by the Government is as complete and as accurate as possible. It is only thus that foreign policy can be firmly grounded on intelligent and informed popular support.

IX. Communication of American Attitudes Abroad

Among the topics of interest to the subcommittee has been the means whereby the attitudes of the American people on the subject of disarmament and peace can be adequately conveyed to other peoples of the world. The subcommittee believes that the best way of doing this is by a vigorously evolving policy that is alert to changing international needs and circumstances and that possesses

[12] Alfred M. Gruenther, Robert A. Lovett, Walter Bedell Smith, and John J. McCloy.

the vitality to keep ahead of the unsleeping Soviet propaganda machine. The subcommittee believes with Secretary of State Dulles that the United States cannot take policy positions solely for their public relations impact and without regard to our national standards and our national interests. The United States cannot act in the arbitrary position of a totalitarian state.

The subcommittee believes, however, that the United States can and should act like the vibrant democracy it is and as the leader of the free world. The initiative displayed by the United States in the United Nations when it proposed Arctic inspection zones in response to the Soviet Union complaint about United States bomber flights was highly effective and impressive. Similarly, the United States displayed effective leadership when it proposed in May 1958 an agreement to continue international scientific cooperation in Antarctica and insure that Antarctica be used for peaceful purposes only.

The subcommittee strongly urges that those executive officials charged with the formulation and conduct of United States disarmament policy be acutely conscious of the fact that arms control is not a problem that affects just the United States and a few other nations, but that it is a problem affecting the survival and well-being of people on every continent. The major powers are being constantly watched and judged as to the energy, sincerity and effectiveness of their disarmament policy. This is especially true of those peoples outside the Western World—the nations of Asia and Africa who are so eager to build for themselves a better, happier and more peaceful world. Not only do they watch expectantly, but in many cases they have the capability and the desire to make a direct contribution themselves to disarmament and peace. There is a need, for instance, to take advantage of the interest and skills of the Japanese in matters relating to nuclear-weapons tests. By showing these nations our high regard for their hopes and aspirations, and by showing our willingness to work closely with them toward our common goal of world peace, we shall not only make our task easier but we will hasten the day when it will be accomplished.

X. The Task for the Future

Disarmament is a vast subject with many ramifications—political, military, scientific, economic and legal. Because of its profound significance in American foreign policy and because any international disarmament agreement would be in the form of a treaty that would be submitted to the Senate for its advice as to ratification, the latter has a deep and abiding interest in negotiations for arms control. The Subcommittee on Disarmament since it was inaugurated has sought diligently to examine all facets of the arms regulation problem but as already indicated at sundry points in the earlier part of this report, there are numerous questions which still require exploration. Many decisions must still be made on which further information and enlightenment are necessary.

Among those aspects of the disarmament question which the subcommittee believes should have priority study at this time are the following:

1. The problems of inspection for all forms of disarmament, but especially for nuclear disarmament and for prevention of surprise attack.
2. Regional disarmament problems, e. g., in Europe.
3. The control of outer space weapons.

This list is not intended to be complete or restrictive, but merely to indicate that there is much "unfinished business" for Senate study. The subcommittee suggests that these topics, as well as others, be scheduled for consideration by the new Senate Foreign Relations Subcommittee on Disarmament in the forthcoming months.

APPENDIXES

APPENDIX I

SUMMARY OF ACTIVITIES OF THE SUBCOMMITTEE ON DISARMAMENT

This summary covers major activities of the subcommittee from the date of its last report, September 6, 1957. For activities prior to this time, see appendix 2 of the subcommittee's report of September 6, 1957.

EXTENSION OF THE SUBCOMMITTEE

The Subcommittee on Disarmament of the Committee on Foreign Relations was established on July 25, 1955, by Senate Resolution 93, 84th Congress, 1st session. It was later extended by Senate Resolution 185 and Senate Resolution 286, 84th Congress, and Senate Resolution 61, Senate Resolution 151, and Senate Resolution 192, 85th Congress. On January 29, 1958, the subcommittee was further extended by Senate Resolution 241, 85th Congress. However, the resolution included language requiring that records, duties, and functions of the subcommittee should be assumed by the full Committee on Foreign Relations at the expiration on July 31, 1958, of this 6-month extension period. On July 15, 1958, the Senate Foreign Relations Committee voted to set up a subcommittee on disarmament composed of six members drawn equally from both parties.[1]

MEMBERSHIP

The period covered by this report saw no change in the membership of the subcommittee. It was composed of Senators Humphrey (chairman), Byrd,[2] Sparkman, Long, Pastore,[3] Symington,[2] Bridges,[2] Wiley, Hickenlooper, Saltonstall,[2] Knowland, and Bricker.[3]

PUBLIC HEARINGS

The subcommittee held 9 days of hearings in Washington during the period February 28 to April 17, 1958. The objectives of these hearings were: (1) to clarify several of the key problems and to get information on the possibility of achieving workable and effective measures to curb the arms race among major powers; (2) to study developments in the field of inspection and nuclear weapons tests and the possibility of devising an inspection system adequate to verify an agreement to suspend such tests; (3) to study the feasibility of an

[1] Senators Humphrey (chairman), Long, Kennedy, Wiley, Hickenlooper, and Langer.
[2] Appointed by the Vice President from the Committee on Armed Services
[3] Appointed by the Vice President from the Joint Committee on Atomic Energy.

inspected cutoff of production of fissionable material for weapons purposes; and (4) to study the possible effect upon our security of a cessation of nuclear-weapons tests or a cutoff of production of fissionable material for weapons purposes. For security reasons, some of the hearings were in executive session. However, most of the testimony received in executive sessions was edited and later made public. The dates and names of witnesses of the published hearings are listed in appendix II.

In addition, the subcommittee held a special session on June 19, 1958, to consult with members of the executive branch regarding the technical conference on inspection for a test ban which convened in Geneva on July 1, 1958.

STAFF STUDIES

To supplement the information received in hearings, the subcommittee canvassed seismologists, as well as geophysicists and geologists with experience in seismology, throughout the United States with a questionnaire on the detection of and inspection for underground nuclear explosions. The 31 replies with a summary were published as a subcommittee staff study.[4]

In the absence of hearings outside of Washington these replies afforded the subcommittee the benefit of the experience that seismologists have had in studying records of underground and surface phenomena.

REPORTS

Prior to this, the subcommittee filed three reports: the first interim report (S. Rept. 1397, 84th Cong., 2d sess.) issued January 17, 1956; the second interim report (S. Rept. No. 2829, 84th Cong., 2d sess.) on September 7, 1956; and the third report on September 6, 1957 (S. Rept. No. 1167, 85th Cong., 1st sess.).

CORRESPONDENCE

The subcommittee's correspondence increased substantially during the period covered by this report. In general these letters very thoughtfully expressed the genuine and deep concern on the part of an increasing number of private individuals and organizations of the problems related to disarmament. The subcommittee has been greatly aided in its study by views and suggestions embodied in these letters.

SUBCOMMITTEE STAFF

The work of the subcommittee was under the general direction of Carl Marcy, chief of staff of the Committee on Foreign Relations.

The staff during the period covered by this report consisted of Ellen C. Collier,[5] Charles Gellner,[5] Betty Goetz, Cyril E. King, Carolyn F. Smith,[5] Sue Sullivan, and Paula Underwood. The subcommittee also received invaluable assistance on specific projects from the Legislative Reference Service and the Science Division of the Library of Congress. It also wishes to note the helpful cooperation received from the Atomic Energy Commission, the Department of

[4] See staff study No. 10 in annex II.
[5] On loan from the Legislative Reference Service, Library of Congress.

State, the Central Intelligence Agency, the Air Force, and the Coast and Geodetic Survey of the Department of Commerce.

Financial statement

Resolution authorizing subcommittee	Congress	Period covered	Funds authorized	Expenditures
S. Res. 93	84th	July 25, 1955, to Jan. 31, 1956	$25,000	$12,242.00
S. Res. 185	do	Feb. 1 to July 1, 1956	35,000	48,986.00
S. Res. 286	do	July 1, 1956, to Jan. 31, 1957	32,000	
S. Res. 61	85th	Feb. 1 to June 30, 1957	30,000	20,000.00
S. Res. 151	do	July 1, 1957, to Jan. 31, 1958	40,000	27,845.50
S. Res. 192	do			
S. Res. 241	do	Feb. 1 to July 31, 1958	34,000	[1] 30,296.32

[1] Estimated

APPENDIX II

LIST OF HEARINGS PUBLISHED BY THE SUBCOMMITTEE

Part 1: January 25, 1956, Hon. Harold E. Stassen, Special Assistant to the President on Disarmament, pages 1–45.

Part 2: February 29, 1956, Hon. John Foster Dulles, Secretary of State, pages 46–80.

Part 3: March 7, 1956, Hon. Ralph E. Flanders, United States Senator from Vermont, accompanied by Richard S. Leghorn, colonel, United States Air Force Reserve; Hon. Lewis L. Strauss, Chairman, United States Atomic Energy Commission; Hon. Theodore C. Streibert, Director, United States Information Agency, pages 81–160.

Part 4: March 15, 1956, Hon. Charles E. Wilson, Secretary of Defense, accompanied by Admiral Arthur W. Radford, Chairman, Joint Chiefs of Staff, pages 161–193.

Part 5: April 9, 1956, Cambridge, Mass., witnesses from Harvard, M. I. T., Boston University, and the general public, pages 194–332.

Part 6: April 12, 1956, Hon. Thomas E. Murray, Commissioner, Atomic Energy Commission, pages 333–370.

Part 7: June 7, 1956, Hon. Harold E. Stassen, Special Assistant to the President on Disarmament, pages 371–416.

Part 8: June 8, 1956, Washington, D. C., hearings for representatives of national organizations, pages 417–591.

Part 9: June 16, 1956, Minneapolis, Minn., hearing for witnesses from the University of Minnesota and the general public, pages 593–767.

Part 10: December 12, 1956, St. Louis, Mo., hearings for witnesses from St. Louis University, Washington University, University of Missouri and the general public, pages 769–959.

Part 11: January 9–10, 1957, Washington, D. C., hearings on overall questions of foreign policy in relation to the control and reduction of armaments. Witnesses: Arthur Dean, former Special Ambassador to Korea; George Kennan, former United States Ambassador to the Soviet Union; George Finch, writer and adviser on international legal problems; Paul Nitze, former head of the Policy Planning Staff of the Department of State; Lt. Gen. Leslie R. Groves (retired) former head of the Manhattan Project to develop the atomic bomb; Benjamin V. Cohen, former United States delegate to the U. N. Disarmament Commission; and Hans Morgenthau, director, Center of Study of American Foreign Policy, University of Chicago; pages 961–1097.

Part 12: January 16–17, 1957, Washington, D. C., hearings on some of the technical problems of the control and reduction of armaments. Witnesses: Thomas K. Finletter, former Secretary of the the Air Force; Warren Weaver, chairman of the committee on genetic effects of atomic radiation for the National Academy of Sciences; John C. Elliott, former Director of the Office of Munitions Control, Department of State, and adviser to the United States representative on the U. N. Commissions on Atomic Energy and Conventional Armaments; Leon Keyserling, former Chairman of the Council of Economic Advisers to the President; and Albert G. Hill, vice president of the Institute for Defense Analyses and former director of the Lincoln Laboratory at M. I. T.; pages 1099–1246.

Part 13: March 7–13, 1957, Washington, D. C., hearings on some of the economic implications of the control and reduction of armaments. Witnesses: Harlan Cleveland, dean of the Maxwell School of Citizenship and Public Affairs, Syracuse University; Gerhard Colm, chief economist, National Planning Association; Seymour Harris, professor of economics, Harvard University; Henry Hazlitt, contributing editor, Newsweek Magazine; and William McChesney Martin, Jr., Chairman, Federal Reserve Board; accompanied by Winfield W. Riefler, assistant to the Chairman, Federal Reserve Board; pages 1247–1333.

Part 14: February 28, 1958, Washington, D. C., hearing on some key problems incident to developing workable and effective measures for the control and reduction of nuclear weapons. Witness: Harold E. Stassen, former Special Assistant to the President for Disarmament; pages 1335–1364.

Part 15: March 6, 1958, Washington, D. C., hearing on the control of nuclear weapons. Witness: Commissioner W. F. Libby, member, Atomic Energy Commission; pages 1365–1386.

Part 16: March 12 and 25, 1958, Washington, D. C., hearings on developments in the field of inspection and on the feasibility of developing an effective inspection system. Witnesses: Dr. Harrison Brown, professor of geochemistry, California Institute of Technology; Dr. Spofford G. English, Deputy Director of Research, United States Atomic Energy Commission; Brig. Gen. Alfred D. Starbird, Director of Military Application, United States Atomic Energy Commission; pages 1387–1451.

Part 17: April 16 and 17, 1958, Washington, D. C., continuation of hearings on developments in the field of inspection and on the feasibility of developing an effective inspection system. Witnesses: Dr. Hans Bethe, professor of physics, Cornell University; Dr. Jay Orear, assistant professor of physics, Columbia University and member of the Columbia University inspection project; Adm. Lewis L. Strauss, Chairman, United States Atomic Energy Commission; accompanied by Gen. A. D. Starbird, Director of Military Application, AEC; Dr. Edward Teller, director, University of California radiation laboratory, Livermore, Calif; pages 1453–1615.

Index to the hearings.

APPENDIX III

MAJOR CORRESPONDENCE WITH THE EXECUTIVE BRANCH AND OTHER COMMITTEES OF THE CONGRESS

EXCHANGE OF CORRESPONDENCE BETWEEN THE CHAIRMAN AND CARL T. DURHAM, CHAIRMAN, JOINT COMMITTEE ON ATOMIC ENERGY, REGARDING RADIOACTIVE FALLOUT AND NUCLEAR WEAPONS TESTS

March 22, 1957.

HON. CARL T. DURHAM,
Chairman, Joint Committee on Atomic Energy,
House of Representatives, Washington, D. C.

DEAR MR. DURHAM: I noted recently your announcement that the Joint Committee on Atomic Energy is planning to hold public hearings on the matter of radioactive fallout and the hazards it may pose for present and future generations. These hearings are needed, and I am pleased to know that you are going into the problem.

You are aware, as I am, of the importance of giving the public as complete and as clear a statement of the present knowledge on radioactive fallout as can be obtained. I believe that your forthcoming hearings will contribute toward this end.

As you undoubtedly know, the Senate Subcommittee on Disarmament has also gone into the question of nuclear weapons tests and whether they threaten the health and safety of the world's populations. This is one of the considerations in evaluating limited disarmament proposals such as a ban on weapons tests. We have received testimony on the problem from experts as well as interested lay groups. The problem has been raised at hearings the subcommittee held in various parts of the country. It has also been the subject of a large amount of the correspondence I have received as chairman of the subcommittee.

Our subcommittee hearings have opened up to the members and to the public several problems arising from nuclear weapons tests but this is only one of the many aspects of the problem of disarmament and, therefore, we have not thus far been able to give the subject adequate and sustained attention which it deserves. It is a subject, however, that the subcommittee has felt it essential to examine and on which it should be informed. I hope that the results of your hearings will be available to the subcommittee and that the staff of the Joint Committee can keep the Disarmament Subcommittee staff apprised of the nonclassified portions of your work.

Since it is unlikely that the Disarmament Subcommittee, in the remaining months of its existence, will itself be able to hold many more hearings I would like to invite the attention of the Joint Committee to some of the testimony received and issues which have been presented to our subcommittee. They pertain to the fallout problem and also the matter of nuclear weapons tests detection. I know you are familiar with many of the questions which certainly deserve more exhaustive consideration than we have been able to give them. With the thought that the principal issues posed by our hearings deserve further examination by the Joint Committee, I enclose a list of questions which have been raised.

I shall appreciate what attention the Joint Committee can give these matters. I am sending a copy of this letter to Senators Bricker,

Hickenlooper, and Pastore, who are members of the Disarmament Subcommittee.

The testimony to which I have referred is being sent to you in care of your staff director, Mr. Ramey.

Sincerely,

HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament.

QUESTIONS REGARDING RADIOACTIVE FALLOUT AND NUCLEAR WEAPONS TESTS

1. To what extent is there a danger to the population of this country and others from the radioactive fallout of nuclear test explosions?

Is it possible to reconcile the different points of view regarding the dangers of radioactive fallout? If not, is there an explanation as to why these differences exist? Would it be feasible for the Joint Committee to undertake to correlate the various studies and opinions regrading the dangers of radioactive fallout? Such a correlation would be helpful to the public and to Members of Congress who are now subject to widely differing points of view on the danger of nuclear weapons tests. Would the creation of a special committee of scientists be a constructive way of trying to resolve the differences of opinion which now exist?

With respect to published findings on the danger of radioactive fallout, all conclusions are based on the presumption that tests would continue at their present rate. Is this a reasonable presumption in view of the number of countries which may conduct their own tests in the future?

In view of the tentativeness of many of the findings on radioactive fallout, is it possible or wise for the Atomic Energy Commission and the executive branch to be so positive in their declarations that nuclear weapons tests do not constitute a health hazard? For example, can we know with certainty the total amount of radioactive fallout being deposited on the earth's surface and the rate at which the deposits are increasing? Is it likely that as research reveals greater knowledge about radioactive substances, such as strontium 90, the maximum permissible concentration levels will be lowered from what they are today?

2. What is the extent of the research being done on problems of radioactive fallout?

How much of the research is being done by Government agencies and how much by private research groups under Government sponsorship and with Government funds?

Must private research groups depend upon the Government, particularly the AEC, for most of their data? That is, to what extent does the depth and breadth of research rest on what the Government is willing to turn over to private research organizations?

How much and what kind of data on radioactive fallout remains classified? What justification is given by the AEC and other Government agencies for continued classification of such information?

Is the AEC presented with a conflict of interest when it is required to act on the one hand as an agent in the development of nuclear weapons, and on the other as an agent to provide safeguards to health

resulting from nuclear weapons experiments? If a conflict of interest does exist, what would be effective ways of removing or at least minimizing the conflict?

If the research being conducted on radioactive fallout is considered to be inadequate, should the Congress increase appropriations for such research?

Should the results of research on radioactive fallout be made available to and reviewed by the Joint Committee on Atomic Energy as well as the Atomic Energy Commission?

3. Is it possible for the Congress to receive information, preferably unclassified, on the detection of nuclear tests?

It is important to resolve present conflicting points of view regarding the detection of nuclear weapons tests. Is it true that present methods of detection can identify anywhere in the world a nuclear test explosion of 1 megaton or higher. Can present methods detect with certainty a test of less than 1 megaton? If not, what type of a system would detect tests of lower yields? To detect tests of lower yields would the devices need to be located within the country testing such as the Soviet Union?

Why must detection methods be so highly classified?

Are there legitimate military considerations for not seeking an agreement to ban tests of 1-megaton bombs or higher? Of 100 kilotons or higher? Can the Congress and the public receive information on some of these military considerations?

Even if valid military considerations against banning large nuclear weapons tests exist, would the United States benefit equally with the Soviet Union if a safeguarded agreement were reached to ban such tests? If not, why not?

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
May 8, 1957.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament, Committee on Foreign Relations, United States Senate.

DEAR SENATOR HUMPHREY: This will acknowledge your letter of March 22, concerning hearings on the radiation fallout problem and confirms discussions between members of our respective staffs.

We have carefully reviewed the questions attached to your letter which were raised in connection with the hearings conducted by the Subcommittee on Disarmament. We have also gone over the hearings conducted by your subcommittee which you kindly sent us. It is our belief that the questions under titles No. 1 and No. 2 of your attachment will be completely covered in the hearings which we have scheduled beginning May 27 and extending through June 7 or 14. These titles are as follows:

"1. To what extent is there a danger to the populations of this country and others from the radioactive fallout of nuclear test explosions?

"2. What is the extent of the research being done on problems of radioactive fallout?"

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Attached for your information is a copy of our latest press release on the scope and approach of our hearings. Also attached is a detailed outline of the scope of the hearings in which your questions were taken into account.

We do not expect to get into your question No. 3 on the detection of nuclear tests during the May 27 series of hearings. However, following these hearings, we do expect, both in executive sessions and possibly in public hearings, to get into the matter of detection of nuclear tests, together with the consideration of proposals for the limiting of tests from a hazards standpoint. It should be noted that in the semifinal windup sessions of the fallout hearings beginning May 27, there will be testimony on the effects of fallout at the current rate of testing as well as at projected increases in the rate of testing and from nuclear warfare.

We, of course, shall be happy to make available to your subcommittee the results of our hearings, and to keep your staff informed on the nonclassified portions of this work.

If you should have any further suggestions as to the scope of our hearings we would appreciate them. You will note that the Honorable Chet Holifield has been designated as chairman of our Special Subcommittee on Radiation which will conduct these coming hearings. Please feel free to contact him or the staff directly.

The cooperation of your subcommittee and of your staff in this endeavor is very much appreciated.

Sincerely yours,

CARL T. DURHAM, *Chairman.*

EXCHANGE OF CORRESPONDENCE BETWEEN THE CHAIRMAN AND LEWIS L. STRAUSS, CHAIRMAN, ATOMIC ENERGY COMMISSION, CONCERNING PROBLEMS OF NUCLEAR WEAPONS CONTROL

MAY 31, 1957.

Hon. LEWIS L. STRAUSS,
Chairman, United States Atomic Energy Commission,
Washington, D. C.

DEAR MR. CHAIRMAN: Recently Secretary Dulles testified before the Subcommittee on Disarmament in executive session. In response to a question concerning the detection of nuclear weapons tests, Secretary Dulles referred the subcommittee to you, and stated that he believed you could supply the information which we need. Needless to say, we will respect all classifications of material, although it would be helpful to be able to make as much of the information as possible available to the public.

At the present time there appear to be conflicting points of view regarding the detection of nuclear weapons tests. Is it a fact that with existing techniques nuclear weapons tests of 1 megaton or more can be reliably detected anywhere in the world? Of 50 kilotons or more? Of 20 kilotons or more? If not, what kind of a system would be necessary to detect tests of various sizes regardless of where they occur? Is there any reason the United States would need further weapons tests if other countries were unable to conduct tests because of the existence of reliable detection techniques and firm agreement to suspend tests? Is it true that a ban on nuclear tests would inhibit, if not prevent, the development of long-range missiles with nuclear warheads?

Present United States proposals for the control of nuclear weapons center around the control of future production of fissionable material and transferring fissionable material from weapons stockpiles to peaceful uses. What inspection provisions would be necessary to control the future production of nuclear materials? What specific experience has the Atomic Energy Commission had with inspection of uses of atomic materials in the United States which might be applicable in an international inspection system? What control measures have been used in connection with the bilateral atoms-for-peace agreements and does experience gained in applying these controls indicate loopholes in such control measures?

Finally, has it been possible to develop tactical atomic weapons with limited radiation danger? Does the use of any atomic weapon, regardless of size, result in radiation? In other words, does the use of atomic weapons involve the contamination of the local area in which fighting takes place at the very least? The subcommittee has received evidence that one of the reasons why chemical and bacteriological weapons were not used in World War II was due to the fluidity of the battlefield with the result that the side using such weapons could not be sure the effects of the weapons would not backfire to its extreme detriment. To what extent does the use of nuclear weapons apply to this situation?

As the Subcommittee on Disarmament is scheduled to terminate on June 30 and must submit a final report by then, I would appreciate receiving this information by June 10. Thank you very much.

Sincerely,

HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament.

ATOMIC ENERGY COMMISSION,
Washington, D. C., June 11, 1957.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Committee on Foreign Relations, United States Senate.

DEAR SENATOR HUMPHREY: This is to answer the questions raised by the Subcommittee on Disarmament which were transmitted to me by your letter of May 31, 1957. Since you stated that it would be helpful if as much information as possible could be made available to the public, I have written this reply on an unclassified basis. The answers to some of your questions include information of a highly classified nature and perhaps it would be best if I were to discuss these aspects in closed session with your committee. In this matter, I am available at your convenience.

I believe it will be helpful if I repeat the question or questions toward which each of my answers is directed.

"* * * *Is it a fact that with existing techniques nuclear weapons tests of 1 megaton or more can be reliably detected anywhere in the world? Of 50 kilotons or more? Of 20 kilotons or more? If not, what kind of a system would be necessary to detect tests of various sizes regardless of where they occur?* * * *"

In regard to the ability of the United States to detect nuclear weapons tests, it is our belief that there are limitations which do not give us adequate assurance that we can detect tests on all the yield ranges

mentioned anywhere in the world. More detailed information to answer your questions on detection is classified and can be given to the committee orally.

"* * * *Is there any reason the United States would need further weapons tests if other countries were unable to conduct tests because of the existence of reliable detection techniques and firm agreement to suspend tests? Is it true that a ban on nuclear tests would inhibit, if not prevent the development of long-range missiles with nuclear warheads?* * * *"

Although the United States can meet a number of nuclear weapon requirements on the basis of present development, a test cessation would affect the development of improved and new weapons delivery systems, which determine the size, weight, shape, and other requirements of the nuclear warheads. We are in a period of radical transition as to the weapons systems that are available and are becoming available. The gains made by other nations in their intercontinental delivery systems have increased the technical possibility of a surprise attack. These improvements in the delivery systems of other nations necessitate a change in our defensive system. We require weapons of smaller size, capable of withstanding extreme conditions, instantly ready and tailored to give the desired effect. These new systems, generally require a new or modified warhead design. Naturally, in view of the reliance we must place on these nuclear weapons systems, new or modified weapons and design changes must be tested if we are to safely depend upon them in an emergency. Experience, to include that of World War II proved that, unfortunately, there is no substitute for tests to determine the reliability of a weapon, conventional or atomic. Though there can be very limited extrapolation of present information without testing, a cessation of tests would seriously cripple our development work in this vital defensive area.

It is my belief that a cessation of tests should be undertaken only as part of a comprehensive safeguarded disarmament plan when there are means in existence of assuring that other nations similarly will cease their testing and hence their development of new systems.

A ban on nuclear tests, which the United States would of course observe, would end shortly the development of significantly improved nuclear warheads and would cut off introduction of improved nuclear weapons systems. Whether a particular long-range missile could be provided with a nuclear warhead would depend upon the state of development of the missile and its nuclear warhead at the time testing ceased. Here, again, I could elaborate on the subject to the committee orally.

"* * * *Present United States proposals for the control of nuclear weapons center around the control of future production of fissionable material and transferring fissionable material from weapons stockpiles to peaceful uses. What inspection provisions would be necessary to control the future production of nuclear materials? What specific experience has the Atomic Energy Commission had with inspection of uses of atomic materials in the United States which might be applicable in an international inspection system? What control measures have been used in connection with the bilateral atoms-for-peace agreement and does experience gained in applying these controls indicate loopholes in such control measures?* * * *"

In regard to your question concerning the control of future production of fissionable materials and fissionable materials transferred from

weapon stockpiles to peaceful uses, it is our conclusion that such control would require complete and continuous access to the nuclear facilities concerned with future production and peaceful uses of nuclear materials. A comprehensive safeguard system would have to be placed in effect throughout these nuclear facilities. Such a system would include complete knowledge of the process and the application of material accountability and physical security measures. There are continuing studies within the AEC to describe the essentials of an inspection and control system necessary to ascertain compliance with an assumed international undertaking to devote all future production of source and special fissionable material to non-weapon uses and to account for any transfers of fissionable material from previous production to non-weapon uses. It is my opinion at this time that, while an adequate system of control and inspection cannot be simple, nevertheless it should be feasible to install such a system.

Although the AEC has had a great deal of specific experience in the control of its fissionable materials, the problem of control in a foreign nation would be more difficult. Much of the experience of the AEC in the United States should be applicable in an international inspection system. For example, the detailed accountability system for nuclear materials throughout the AEC can be developed to apply to an international inspection system.

The control measures used in connection with the bilateral atoms-for-peace agreements for cooperation involving significant amounts of nuclear materials will consist of a control system that could form the basis of an international inspection system. The United States agreements for cooperation under the atoms-for-peace program contain safeguard provisions to assure that the materials, equipment, and facilities covered by the agreements are used only for peaceful purposes. These safeguard provisions give the United States certain rights, which we will exercise, to ascertain that the provisions of the agreements for cooperation in the atomic power field include, among many others, requirements for the maintenance of complete operating and accountability records, the submission of reports, and the right of designated United States personnel to have access in the foreign country to all places and data necessary to account for materials and to make independent measurement to this end. This right, of course, applies in such cases only to materials furnished by the United States.

To date, there has been limited opportunity to acquire experience with control measures under bilateral agreement as these are in the very early stages of implementation. As experience is gained in this area it will be of value in the application of control measures in the disarmament field.

"* * * *Finally, has it been possible to develop tactical atomic weapons with limited radiation danger? Does the use of any atomic weapon, regardless of size, result in radiation? In other words, does the use of atomic weapons involve the contamination of the local area in which fighting takes place at the very least?* * * *"

All atomic weapons, including tactical weapons, produce radioactive debris. Whether or not this results in a radiation danger in the local area in which the detonation takes place depends to a major extent on the weapon's fission yield and on its conditions of firing. A weapon detonated at or near the surface could be expected to provide a highly

contaminated local area, whose size depends on the yield and design of the weapon and the meteorological conditions. However, if the weapon is fired in the air at an altitude so that the fireball does not touch the ground, the radioactive debris would be widely dispersed and only a small area, if any, would be subject to heavier fallout. Also, as was proved in Operation Redwing in mid-1956, it is now possible to design large thermonuclear weapons which produce very much less radioactive debris than previous designs for the same total yield.

"* * * *The subcommittee has received evidence that one of the reasons why chemical and bacteriological weapons were not used in World War II was due to the fluidity of the battlefield with the result that the side using such weapons could not be sure the effects of the weapons would not backfire to their extreme detriment. To what extent does the use of nuclear weapons apply to this situation?* * * *"

I believe that the answer to this question falls within the purview of the Department of Defense in that it is that Department which is responsible for drawing up defense plans and procedures. I would suggest, therefore, this question be directed to the Secretary of Defense. In that its answer may involve classified discussions, you might desire to request that a witness be present to testify in this regard at the same time that I would appear before you.

In view of the short time available to prepare the information you desire, I am forwarding my reply before the other Commissioners have had an opportunity to review it. I am circulating this reply to them immediately and shall inform you if they desire to add comments.

Sincerely yours,

LEWIS L. STRAUSS, *Chairman.*

EXCHANGE OF CORRESPONDENCE BETWEEN THE CHAIRMAN AND THE EXECUTIVE BRANCH CONCERNING REPORTS OF TASK FORCES ON INSPECTION

SEPTEMBER 16, 1957.

Hon. JOHN FOSTER DULLES,
Secretary of State, Washington, D. C.

DEAR MR. SECRETARY: In your appearance before the Subcommittee on Disarmament on June 27, 1957, you stated that you would make available for use of the subcommittee the studies on inspection prepared by the task forces of experts appointed by Mr. Stassen, and I said I would contact you when the material was needed. I have now requested the staff of the subcommittee to undertake a study on inspection of an arms-control agreement and would like for them to read the task force reports for background information.

Could you arrange to have them sent to the Foreign Relations Committee in room F–53 in the Capitol, attention Mrs. Ellen Collier. Or, if you prefer, a member of the staff could come to the State Department to read the reports.

Sincerely,

HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament.

DEPARTMENT OF STATE,
Washington, October 3, 1957.

Hon. HUBERT H. HUMPHREY,
United States Senate.

DEAR SENATOR HUMPHREY: I have looked into your request of September 16 for material to assist in a study of inspection of an arms control agreement. I understand that, at your request, the Department has sent you a copy of a Department of Defense report entitled "Outline Plan for Implementation of an Aerial Ground Inspection System in First Phase Disarmament."

I hope this will prove to meet the needs of the study you have in mind. If it does not, representatives of the Department would be glad to discuss the subject with members of the subcommittee staff.

Sincerely yours,

JOHN FOSTER DULLES.

OCTOBER 17, 1957.

Hon. JOHN FOSTER DULLES,
Secretary of State, Washington, D. C.

DEAR MR. SECRETARY: Your letter of October 3 indicates that there may have been some misunderstanding as to the material on inspection that the Subcommittee on Disarmament is attempting to secure. We would like to see the reports on inspection which were prepared by the eight task forces commissioned by Mr. Stassen in1955 to study various aspects of inspection. The heads of these task forces were Dr. Ernest O. Lawrence, Gen. James H. Doolittle, Vice Adm. Oswald S. Colclough, Lt. Gen. Walter Bedell Smith, Benjamin Fairless, Walker L. Cisler, Dr. Harold Moulton and Dr. James B. Fisk. As I mentioned in my letter to you of September 16 you stated before the Subcommittee on Disarmament on June 27, 1957, that you would make available for use of the subcommittee the studies prepared by these task forces.

I should appreciate it if a representative of the Department of State could discuss the matter with Miss Betty Goetz, the staff director of the Subcommittee on Disarmament.

We did receive the Outline Plan for the Implementation of Aerial Ground Inspection System in the First Phase of Disarmament which you mentioned in your letter. While this was helpful it was a study of only a limited phase of inspection and apparently was prepared by the Department of Defense rather than a task-force group.

Sincerely,

HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament.

DEPARTMENT OF STATE,
Washington, November 6, 1957.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
United States Senate.

DEAR SENATOR HUMPHREY: I have your letter of October 17, in which you identify eight task-force studies on inspection which the Senate Subcommittee on Disarmament would like to examine.

I find that these studies were prepared under the direction of Governor Stassen prior to his association with the Department of State. I have checked with Governor Stassen, and he tells me the studies were prepared with the understanding that they would be for the express use of the President. We do not, therefore, believe that we can properly make them available to the subcommittee.

I regret that under the circumstances I cannot send you a more favorable reply in this matter.

Sincerely yours,

JOHN FOSTER DULLES.

The PRESIDENT,
The White House,
Washington, D. C.

MY DEAR MR. PRESIDENT: On October 7, 1955, Mr. Harold Stassen, as your Special Assistant for Disarmament, announced that eight task force study groups had been appointed to make "a new, fundamental and extensive expert study * * * of the methods of international inspection and control." It seemed to me that the appointment of these task forces was commendable in view of the importance of inspection in any agreement on the control and reduction of armaments.

It is my feeling that the problems of inspection in a disarmament system need to have a great deal of attention by all those concerned with arriving at a safeguarded agreement. Consequently I asked Mr. Stassen whether the reports of the task forces could be made available to our subcommittee. His response at the time was that the reports were not in a usable form. Subsequently, I repeated my request to Mr. Dulles, and although he first agreed to make the reports available, he later indicated that the task force reports were prepared only for your use. I now, Mr. President, ask of you whether the subcommittee might have the task force studies made available to it for study. I am sure that the findings of the various task forces on inspection would give the Subcommittee on Disarmament valuable insight into the problems involved in reaching a disarmament agreement and be an aid as background material in the study of disarmament which the subcommittee is conducting.

You can be assured that any classification of the material would be scrupulously observed in the event you could see fit to extend to us access to the task force reports.

Respectfully,

HUBERT H. HUMPHREY.

THE WHITE HOUSE,
Washington, December 4, 1957.

Hon. HUBERT H. HUMPHREY,
United States Senate,
Washington, D. C.

DEAR SENATOR HUMPHREY: I have your letter asking that I make available to your Disarmament Subcommittee the eight task force studies on international inspection and control that were prepared as a basis for policy decisions in the field of disarmament. These studies were prepared for the National Security Council and for my own use,

and I prevailed upon various individuals to undertake these studies on this understanding. In view of this circumstance and the nature of the information these studies contain, I believe it would not serve the public interest to make them available outside the very limited group that has had to have access to them.

With best wishes and warm regards.

Sincerely,

DWIGHT D. EISENHOWER.

EXCHANGE OF CORRESPONDENCE BETWEEN THE CHAIRMAN AND PRESIDENT EISENHOWER CONCERNING SUSPENSION OF NUCLEAR-WEAPON TESTS

NOVEMBER 4, 1957.

The PRESIDENT,
The White House,
Washington, D. C.

MY DEAR MR. PRESIDENT: I have become increasingly concerned with the recent developments regarding the efforts of the major powers to reach a first-step agreement on the control and reduction of armaments. I feel that we are fast approaching a stalemate which will be difficult to break. By this I mean that the United States and the Soviet Union have taken positions which seem to leave little room for compromise.

There is no question in my mind that the major responsibility for the present stalemate rests with the Soviet Union. If the Russians had not insisted on abruptly terminating the London negotiations we would at least be in the position of exploring the various possibilities for a limited and safe agreement. However, I also believe that the United States has taken an unnecessarily rigid position in its insistence on combining a 2-year ban on nuclear-weapon tests with a cutoff in the production of fissionable materials for weapons purposes and also with aerial and ground inspection zones to guard against surprise attack. While I understand the basis of the various parts of the present United States proposals, I do not think that their inseparableness should represent an ultimate position.

Throughout the summer months I participated, as chairman of the Senate Foreign Relations Subcommittee on Disarmament, in weekly meetings with the Secretary of State or his deputies regarding the progress of the disarmament talks. These meetings were constructive and gave those of us on the subcommittee an opportunity to explore the position of your administration on the disarmament issue. As a result of these meetings as well as the independent research and hearings conducted by the subcommittee it appears that there is no military reason why a 2-year ban on nuclear weapons tests must be accompanied by agreement to cease the manufacture of fissionable materials for weapons purposes. In fact, the present disarmament package of the United States has its disadvantages. One of these is stated as a conclusion of the unanimous recent report of the Senate Disarmament Subcommittee:

"The subcommittee has concluded that a disarmament agreement must include measures to test the observance of its provisions. Measures for inspection, adequate to safeguard each separate disarmament proposal in the package may, however, when added together, be so extensive as to be impractical or unacceptable."

I would like to suggest, Mr. President, that the United States, after consulting with its allies, declare its willingness to negotiate separately on a ban on nuclear weapons tests for a 2-year period with the only condition being agreement on an effective inspection system with United Nations supervision to insure that the ban is being scrupulously observed.

It is my belief that such a proposal would be a safe and reasonable one. It would be a concrete step toward ending the arms race. It would also enable the people of this and other countries to learn more clearly whether the Soviet Union is truly ready to accept effective inspection. We cannot challenge the intentions of the Soviet Union on inspection unless we are in a position to negotiate on a test ban irrespective of the other measures in the four power disarmament proposal.

I have discussed this matter with Governor Stassen. These discussions have convinced me that this course of action would be in the best interests of the United States and should be proposed by the earliest possible date to the United Nations General Assembly.

Respectfully,

HUBERT H. HUMPHREY.

THE WHITE HOUSE,
Washington, November 8, 1957.

Hon. HUBERT H. HUMPHREY,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: Thank you for your letter of November 4. I appreciate your comments based upon your observations and review in your subcommittee.

The entire subject of nuclear tests and its relationship to disarmament agreement is under continuing study and review. I am referring copies of your letter to the Secretary of State, the Secretary of Defense, and the Chairman of the Atomic Energy Commission for their consideration in connection with their own recommendations to me. Your own views will be helpful to us.

With best wishes.

Sincerely,

DWIGHT D. EISENHOWER.

EXCHANGE OF CORRESPONDENCE BETWEEN THE CHAIRMAN AND PRESIDENT EISENHOWER CONCERNING THE WHITE HOUSE DISARMAMENT OFFICE

DECEMBER 27, 1957.

The PRESIDENT,
The White House,
Washington, D. C.

DEAR MR. PRESIDENT: Recently I have noticed reports in the press to the effect that the Office of Disarmament within your administration is about to be reduced considerably in size and function. I hope this is not true. However, I am taking this means of expressing directly to you my personal concern over such reports and my apprehension over their apparent accuracy.

The problem of armaments control, as you know, is as complex and difficult a problem as any facing this country. Given continued

Soviet intransigence, it may be insoluble. In any case, it will not be solved easily, for we do not have the sole power to achieve a solution. However, the United States has a tremendous and continuing obligation to the people of all nations to put forth our very best efforts to achieve some measure of control over the new weapons now being produced and soon to be spread throughout the world. We must not only say, and say convincingly, that we are devoted to finding new avenues of approach. We must actually, seriously, make these approaches.

There have also been press statements indicating that your special assistant for disarmament may be resigning his post. If this is true, I hope his successor will be given all the support he deserves in the performance of his difficult assignment.

Last September, the unanimous and bipartisan report of the Senate Disarmament Subcommittee made several very pertinent recommendations regarding the organization of the Disarmament Office. I hope that you will not consider it to be presumptuous if I quote the following from that report:

"The subcommittee agrees that the Office of Disarmament should be maintained within the Department of State. It should be adequately staffed by competent personnel experienced in the various aspects of arms control. * * * The subcommittee believes that although the executive branch has made a considerable effort to resolve the many issues confronting it in formulating disarmament policy, a still greater effort should be made. The President and the Secretary of State should make sure that the head of the Office of Disarmament has the authority and the funds to make this effort. If they are not so confident, then the subcommittee suggests that the President consider whether the Congress should be asked to grant the necessary authority and to appropriate the needed funds."

Mr. President, I believe these recommendations should be taken seriously and acted upon, now that this matter is up for review.

As chairman of the Senate Foreign Relations Subcommittee on Disarmament, I have made a genuine effort to treat the problem of arms control in a bipartisan spirit. I have tried to tender my personal suggestions or criticisms primarily in private in the hope that the administration would give them careful attention, and that if they were rejected, I would be given a reasonable explanation of why a different course should be pursued.

In all honesty I wish to say now, Mr. President, that I find myself increasingly in disagreement with many of our official policies and attitudes. I find that true with respect to the position taken on nuclear weapons tests as expressed in your letter to Mr. Nehru, on the inadequacy of our proposals at the NATO Conference, and on our apparent inability or unwillingness to reexamine our entire disarmament package to determine whether it should be modified.

These issues are by no means dead. Their disposition will be affected by the disposition made of the Office of Disarmament itself.

Sincerely yours,

HUBERT H. HUMPHREY.

THE WHITE HOUSE,
Washington, January 3, 1958.

Hon. HUBERT H. HUMPHREY,
United States Senate,
Washington, D. C.

DEAR SENATOR HUMPHREY: I appreciate your thoughtful letter on the always difficult subject of disarmament. As your letter indicates, I and my associates are at this very time reappraising the various problems in all of the aspects that you mention. Your personal suggestions will be helpful, and I thank you sincerely for sending them to me.

With best wishes.

Sincerely,

DWIGHT D. EISENHOWER.

EXCHANGE OF CORRESPONDENCE BETWEEN W. F. LIBBY, COMMISSIONER, ATOMIC ENERGY COMMISSION, AND THE CHAIRMAN CONCERNING DETECTION OF RAINIER UNDERGROUND TEST

ATOMIC ENERGY COMMISSION,
Washington, D. C., March 12, 1958.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Committee on Foreign Relations,
United States Senate.

DEAR SENATOR HUMPHREY: I am writing this to explain to you the error which resulted in a misstatement by the Commission on the maximum distance at which there was seismological detection of the Rainier underground nuclear test explosion in Nevada last September.

The error was contained in the background material issued in connection with a press tour on March 6 of the site of the Rainier detonation. This background information reported in essence that the farthest point of detection was in Los Angeles, 250 airline miles from the site of the shot. When we determined on March 10 that an error had been made, the AEC immediately issued a correction noting that the shot had been detected by a seismological station at College near Fairbanks, Alaska, some 2,320 miles from the test site.

Let me assure you that the error was entirely inadvertent and was not a deliberate one. There was no intention and no attempt to distort or misrepresent scientific facts for any political purpose.

A very significant point, of course, is whether the underground detonation of a nuclear weapon can be invariably detected and identified at considerable distances by seismological means.

The stations detecting the Rainier underground shot were alerted in advance as to time and location of the detonation. Whether a nonalerted station hundreds or thousands of miles distant could detect an earth disturbance and identify it as having been caused by a nuclear detonation is a matter which clearly calls for more detailed testimony from seismological authorities. We understand that your committee intends to consult such authorities in the near future.

Sincerely yours,

W. F. LIBBY, *Acting Chairman.*

MARCH 20, 1958.

Hon. W. F. LIBBY,
Commissioner, Atomic Energy Commission,
Washington, D. C.

DEAR DR. LIBBY: As chairman of the Subcommittee on Disarmament, I want to thank you for your appearance before the subcommittee on March 6. Your testimony, which I have since seen, was extremely enlightening and constructive. I understand that much of what was released had been previously classified and for that reason the subcommittee and the public must be especially indebted to you for your efforts to make the information available.

I also wish to acknowledge your letter to me of March 12 regarding the unfortunate error contained in the Commission's press release of March 6. The record of the events leading up to the issuance of the March 6 release indicates that the error was, as you termed it, "inadvertent." The record does seem to suggest, however, that this incident would not have occurred if the Commission had been sufficiently sensitive to the importance of the detection of nuclear tests to any future arms-control agreement.

I would like to emphasize that it has not been my purpose to have a debate or argument with the Commission. An examination of my statement to the Senate on March 11 will show that what I sought to do was underscore the necessity of having all reports of the Atomic Energy Commission relating to the matter of test detection be factual, complete, and comprehensive in their analysis and scientifically objective.

As I understand the organization of functions within the Commission, the matter of test detection comes under the Division of Military Application. This division's primary responsibility is the development of nuclear weapons and the problem of test detection appears to be of secondary concern. The director of the division confirmed this at the March 15 hearing of the Joint Committee on Atomic Energy. The director said at that time:

"The task of the laboratory and of our forces out in the field was to analyze the effect as [the explosion] might do damage close by. This was our only real interest at that time in the effect of a quake or shock. * * * We were looking, therefore, to try to find out what was the scale of the shock, how big it was with respect to an earthquake. We took certain significant records, generally records that were close in, records which were within 110 to 350 miles that showed clearly a signal, and we analyzed these with the objective of coming up with a measure of the shot. Therefore, personally, at the time I heard the remark [about the test being detected in Alaska] before the [Joint Atomic Energy] Committee, I did not take this to be of any great significance to what I was trying to achieve * * *."

It occurs to me, therefore, that perhaps the division of military application with its concern with weapons development is not the appropriate division of the Atomic Energy Commission to have responsibility for test detection matters. I respectfully suggest that this be a subject of further consideration by the Commissioners.

A second question regarding test detection relates to the work of the many qualified scientists who were associated with the Rainier explosion. According to the report of the Radiation Laboratory at

the University of California on the Rainier shot, one of the technical objectives of the test was "to measure and evaluate seismic signals and effects at distances extending from the point of detonation out to all distances where the signals could be detected." Since this was one of the objectives of the test, I believe it would have been helpful if the report had discussed in greater detail the seismic signals. For example, press reports of the test of last September indicated some 600 seismic stations were alerted to the fact a test was about to take place. The report issued by the Livermore site, however, states merely that "records were available from 7 of these stations located 110 to 350 miles from the test detonation."

I believe that additional, if not complete, data should also have been forthcoming in view of press reports that scientists associated with the Rainier explosion developed a hypothesis that the shot would not be detected more than a few hundred, or at most 1,000 miles away. The New York Times of September 20, 1957, reported that "in general the experiment seemed to have conformed with predictions of the Atomic Energy Commission scientists that the explosion would not be detectable more than a few hundred miles away." The Los Angeles Times reported on the same date that "scientists at more than 600 earthquake-recording stations around the globe had looked forward to the unprecedented test, hoping the blast's shock waves would race to the earth's heart to encircle it via its rocky outer crust. But the mesa sopped up the waves like a sponge and a leading quake expert said he doubts even the most sensitive instruments could have detected them 1,000 miles away."

Since the hypothesis was proved wrong as a result of the test being detected at College, Alaska, 2,300 miles away from the test site, it would seem doubly important that reports of the shot should contain a thorough account of what happened.

I realize that the various reports of these tests cannot cover the findings in every detail. But because the Atomic Energy Commission and the many institutions working with it have so much of the data on which plans for armaments control must be based, it is important that all of these agencies be especially conscious of the significance of their work in this respect. For example, many of the scientists who were responsible for conducting and reporting on the Rainier shot were members of Mr. Stassen's task force to make studies and recommendations on matters of nuclear inspection. This close association ought to mean that problems of inspection in the arms-control field are considered and dealt with in some of the Atomic Energy Commission sponsored projects.

Again let me thank you for your cooperation with the disarmament subcommittee. Although I am not a member of the Joint Atomic Energy Committee, I would be pleased to be kept informed of any work of the Commission which might affect the disarmament problem.

Sincerely,

HUBERT H. HUMPHREY.

EXCHANGE OF CORRESPONDENCE BETWEEN SENATOR HUMPHREY AND PRESIDENT EISENHOWER CONCERNING STUDY OF INSPECTION SYSTEM NECESSARY FOR NUCLEAR TEST SUSPENSION

MAY 16, 1958.

The PRESIDENT,
The White House,
Washington, D. C.

DEAR MR. PRESIDENT: It is my understanding that you are currently considering your reply to the note of Mr. Khrushchev of May 9. In that note Mr. Khrushchev agreed to one of your earlier proposals; namely, to establish a scientific group to study the inspection system necessary to assure that a nuclear test suspension was being observed.

I am writing this letter to urge you to pursue this apparent change in Soviet policy so that we may find out whether the Soviet Union is or is not willing to agree to a supervised test suspension. If an adequately inspected test suspension could be agreed upon, I believe it would be a meaningful but safeguarded first step toward slowing down the armaments race. It would help to relieve tension throughout the world, and it would reduce whatever risk to human health there may be in continued testing. If the Soviet Union would not accept the necessary inspection system, the Soviet unilateral test cessation and pleas for test cessation would be exposed as hypocritical and deceitful.

The main purpose of this letter is to inform you of the availability of replies to a questionnaire sent by the Subcommittee on Disarmament to some 37 seismologists. The questionnaire dealt with the detection of underground nuclear explosions and the inspection system needed to verify a test suspension agreement.

Our analysis of the replies to this questionnaire is not yet complete. However, I believe that Dr. Killian would find the answers to the questionnaire of considerable use in his work on devising an inspection system for a nuclear test suspension. If he or any of the members of his committee wishes to see these replies I would be pleased to send them to the White House.

The Disarmament Subcommittee is eager to cooperate with the executive branch on this most vital and complex question of arms control.

Respectfully,

HUBERT H. HUMPHREY.

THE WHITE HOUSE,
Washington, May 30, 1958.

Hon. HUBERT H. HUMPHREY,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: My reply to Mr. Khrushchev's letter of May 9 has, I am sure, dispelled any questions you might have had concerning our desire to begin as soon as possible technical discussions with the Soviet Union on the details of an inspection system to assure that any nuclear test suspension agreed to would be effectively controlled. Needless to say, we hope that this will be the beginning of further constructive first steps leading to an effective and controlled arms-limitation agreement.

As, of course, you know, we have also announced that the members of our United States delegation would be Drs. J. B. Fisk, E. O. Lawrence, and Robert F. Bacher.

I appreciate your thoughtfulness in making available to Dr. Killian the replies of a number of seismologists to your questionnaire dealing with the detection of underground nuclear explosions. When the replies are compiled Dr. Killian would, I am sure, welcome the opportunity to review them. In this regard may I suggest that they be sent at your convenience directly to Dr. Killian's office. Thank you for your kind cooperation in this matter.

With best wishes.

Sincerely,

DWIGHT D. EISENHOWER.

EXCHANGE OF CORRESPONDENCE BETWEEN THE CHAIRMAN AND THE EXECUTIVE BRANCH CONCERNING UTILIZATION OF THE INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS IN THE TEST CONTROL SYSTEM

JUNE 12, 1958.

Hon. JOHN FOSTER DULLES,
Secretary of State,
Washington, D. C.

DEAR MR. SECRETARY: As you may know, the Senate Subcommittee on Disarmament has recently compiled the replies to a questionnaire it sent to leading American seismologists. A summary of the replies as well as the full text of them have been made available to agencies of the executive branch and will be released to the public in about a week. A major part of this questionnaire dealt with the problems involved in establishing an inspection system capable of detecting underground nuclear explosions. In addition, the subcommittee has held several hearings on the problems of establishing an inspection system.

On the basis of this study, it seems evident that a key element of an inspection system will be the establishment of a central agency comprised of a group of trained seismologists to interpret seismograms from all over the world. This agency would need to submit analytical data immediately after seismographic and other evidence indicated that unusual or ambiguous earth movements had occurred. In view of the importance of such an agency and in view further of the forthcoming discussions of scientists in Geneva on an inspection system, I propose that the International Union of Geodesy and Geophysics (IUGG) be asked to help establish this central agency.

Specifically, I believe that the International Central Bureau of Seismology, which is under the IUGG and located in Strasbourg, France, might be utilized by the United Nations as a central reporting and coordinating agency. Unquestionably, the Bureau would need to be expanded greatly to fulfill this function. However, because of its splendid scientific reputation and contacts with seismologists throughout the world, it would form a valuable nucleus. Fifty-four countries, including the Soviet Union and other countries of Eastern Europe as well as Japan and most of the countries of Asia, the Middle East, Latin America, and Europe, are represented in the IUGG through the equivalent of our National Academy of Sciences

National Research Council. The Association of Seismology's bureau at Strasbourg receives reports on earthquakes from all over the world. Its data are analyzed and published. These services plus that of our own Coast and Geodetic Survey and the Jesuit network of seismological observatories, appear to be the only systems to collect, interpret, and disseminate worldwide seismological data on a regular basis.

What I have in mind is that the U. N., as the agent in charge of operating the inspection system for a suspension of weapons tests, might contract to use the services of the Strasbourg bureau. The bureau could call upon the skill and knowledge of geophysicists and seismologists throughout the world. The inspection system could benefit from a worldwide pool of knowledge rather than relying on expert personnel of a single country.

It would be especially appropriate to have the agency located so centrally, in France, a country which has already contributed so much to the cause of world peace. France has been a leader in all the disarmament negotiations of the postwar period, especially through its expert, Jules Moch. Having the central reporting agency located in France would be a fitting tribute to the contribution France has made to the problem of disarmament.

I wish to emphasize that I would like to see such a plan explored because I think that private international organizations should be utilized to the fullest in solving the many problems that confront us. I hope that this suggestion will be given careful consideration.

I am sending a copy of this letter to Dr. Killian and am releasing it to the press for Sunday papers.

Sincerely,

HUBERT H. HUMPHREY.

DEPARTMENT OF STATE,
Washington, June 20, 1958.

Hon. HUBERT H. HUMPHREY,
United States Senate.

DEAR SENATOR HUMPHREY: The Secretary has asked me to thank you for your letter of June 12, 1958. Your proposal concerning utilization of the International Central Bureau of Seismology under the International Union of Geodesy and Geophysics as a central reporting and coordinating agency for detection of underground nuclear test explosions is most interesting.

Since your suggestion properly falls within the bounds of studies now being undertaken by our panel of technical experts on test detection, the Secretary has asked me to forward your letter to Dr. Fisk and his colleagues. They will give, I am sure, serious and detailed consideration to the proposal you have presented.

I should like to take this opportunity to express the Department's gratitude for your continuing interest in and contribution to United States disarmament efforts.

Sincerely yours,

WILLIAM B. MACOMBER, Jr.,
Assistant Secretary.

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JUNE 12, 1958.

Dr. JAMES R. KILLIAN, Jr.,
Special Assistant to the President for Science and Technology, the White House, Washington, D. C.

DEAR DR. KILLIAN: Enclosed is a copy of a letter I have sent to Secretary Dulles. It contains a proposal that the International Union of Geodesy and Geophysics be called upon to help in the establishment of a central agency to receive reports from scientific instruments set up throughout the world as part of an inspection system to monitor a suspension of nuclear weapons tests. There would be many advantages in having the IUGG's international Central Bureau of Seismology in Strasbourg, France, serve as the central reporting agency for seismographic data. Obviously the bureau would need to be expanded greatly but it does seem to have considerable experience which could be utilized in the inspection system.

I hope that this proposal can be given full consideration by the scientists when they confer on the inspection system in Geneva. In pursuing this suggestion you may wish to consult with the leading officers of the International Association of Seismology: Sir Harold Jeffreys, St Johns College, Cambridge, England, president; Marcus Bath, Meteorological Institute, Upsala, Sweden, secretary; and Jean Pierre Rothe, 38 Boulevard d'Anvers, Strasbourg, France, Director of the bureau.

Sincerely,

HUBERT H. HUMPHREY.

THE WHITE HOUSE,
Washington, June 20, 1958.

Hon. HUBERT H. HUMPHREY,
United States Senate,
Washington, D. C.

DEAR SENATOR HUMPHREY: Thank you for your letter of June 16 enclosing a copy of your letter to Secretary Dulles about the possibility that the International Union of Geodesy and Geophysics might be called upon to help in the establishment of a central agency to receive reports from scientific instruments set up throughout the world, as part of an inspection system.

I have shown this letter to Dr. Fisk, who is chairman of our team which is going to Geneva for the discussions with the Russians. I will also explore your suggestion with the other scientists and I shall hope to have a reaction for you at a later time.

Yours sincerely,

J. R. KILLIAN, Jr.

ANNEX I. PREVIOUS REPORTS OF THE SUBCOMMITTEE ON DISARMAMENT

CONTROL AND REDUCTION OF ARMAMENTS
REPORT OF SEPTEMBER 6, 1957

FOREWORD

The Committee on Foreign Relations transmits herewith to the Senate a report of the Subcommittee on Disarmament, created pursuant to the terms of Senate Resolutions 93, 185, and 286, 84th Congress, and Senate Resolutions 61, 151, and 192, 85th Congress. Permission to file this report during the adjournment of the Congress was granted in the Senate on August 28, 1957.

This report is submitted to the Senate by Senator Hubert H. Humphrey, chairman of the subcommittee.

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85TH CONGRESS } SENATE { REPORT
1st Session } { No. 1167

CONTROL AND REDUCTION OF ARMAMENTS

SEPTEMBER 6, 1957.—Filed under authority of the order of the Senate of August 28, 1957, and ordered to be printed

Mr. HUMPHREY, from the Committee on Foreign Relations, submitted the following

REPORT

[Pursuant to S. Res. 93, S. Res. 185, and S. Res. 286, 84th Cong., and extended by S. Res. 61, S. Res. 151, and S. Res. 192, 85th Cong.]

I. INTRODUCTION

The Senate Foreign Relations Subcommittee on Disarmament herewith submits its report on its findings and conclusions to date. The subcommittee was created 2 years ago, on July 25, 1955, by Senate Resolution 93 of the 84th Congress. It was instructed to study the disarmament problem from various aspects; that is, proposals of the major powers, as well as private citizens and groups; efforts of the United Nations; the relationship of international tension to disarmament; the relationship of armaments to the world economy; methods by which the views of the American people on disarmament are communicated abroad; and methods to insure that reductions in armaments do not endanger our national security. The subcommittee has looked into these and other aspects of the problem through hearings held in Washington and other cities and through the publication of staff studies. A more detailed description of the work of the subcommittee is contained in the appendix to this report.

The problem of disarmament is one of the most difficult facing the people of this country. For centuries, literally, nations have sought to devise ways by which wars could be prevented and armaments curtailed. Unfortunately, the search for a secure and disarmed world has to date been unsuccessful.[1] The fact that the goal of a peaceful world has been so elusive must not cause us to despair. A difficult and almost insurmountable problem cannot be solved by ignoring it or by treating it superficially. Only the greatest dedication and perseverance may help overcome the obstacles to the achievement of permanent world peace.

[1] Many events related to disarmament are summarized briefly in staff study No. 2 of the Subcommittee on Disarmament, Disarmament, a Selected Chronology, January 1, 1918–March 19, 1956. April 1956.

II. Summary of Major Conclusions and Recommendations

NEED FOR DISARMAMENT

Although the possession of nuclear weapons, along with the capacity to deliver those weapons, by both the United States and the Soviet Union has resulted to some degree in a stalemate, we should not be content to base our security totally on the concept of nuclear deterrence. The potential spread of nuclear-weapons production among many countries, the increasing possibility of pushbutton warfare started in haste by an irrational leader, and the constant spiral of the cost of the arms race make the need for progress on disarmament one of the most pressing tasks confronting mankind. Some headway on halting the arms race must be made.

RELATIONSHIP OF INTERNATIONAL TENSION TO ARMAMENTS

Efforts to reduce international tension and diminish the threat of war should be pursued by trying to settle political problems and through negotiations to curtail and control armaments. Large-scale reduction of armaments cannot be made without corresponding progress on the resolution of at least some political issues. However, we should not wait for the solution of all outstanding political problems before making a start to control armaments.

The division of Germany and the aggressive nature of Communist China are the two most outstanding political problems which are impeding progress on arms control. The United States, the Soviet Union, the United Kingdom, France, and Germany should at an early date make a renewed effort to negotiate on German reunification. If German unification is to be realized, both the Communist countries in Europe, including the Soviet Union, and the NATO countries, including the United States, would probably need to accept some restrictions on their armed forces and armaments, particularly in the area of Europe.

The United States could not sign an agreement with the U. S. S. R. and other countries to reduce its armaments substantially as long as Communist China pursues a policy of aggression and of threats of violence.

In other areas where international tension is high, the United States can help to seek peaceful solutions. Through the United Nations, the executive branch should press for the extension of international law to cover some disputes now treated as political. It should also support in the United Nations measures to continue the use of limited arms control measures, particularly the use of demilitarized zones and an international police force. Finally, more attention should be paid to the existence of the expanding trade in armaments between the large and small nations. This problem calls for study and action by the United Nations.

NATURE OF A DISARMAMENT AGREEMENT

To give the disarmament discussions their best chance of success, the United States must maintain its military posture. A disarmament agreement—that is, a first step agreement—should be limited rather than comprehensive in scope. It should not rely on the good faith of the parties to it; all of its provisions should be subject to verification.

The most effective way to insure that an agreement is being observed is through thorough inspection but, since each of the United States proposals for disarmament must carry with it necessary inspection measures, the scope of such proposals may need to be limited so as to keep the total inspection measures within acceptable and workable limits. Our experience in Korea proved that the details of inspection provisions in an agreement should be meticulously worked out. If the details of proposed inspection plans have not been drawn up, the executive branch should proceed promptly to prepare them.

All disarmament proposals examined by the subcommittee entail some risks; none is absolutely foolproof. However, the risks of acting to try to control the arms race and to reduce the threat of war are less than are the risks of doing nothing.

Under present world conditions a disarmament agreement could not be guaranteed by enforcement measures. Enforcement must rest on agreements which are mutually advantageous and which contain effective inspection provisions.

It is essential that the executive branch continue to cooperate on disarmament matters with its allies represented on the United Nations Disarmament Subcommittee and with the nations belonging to NATO. The executive branch should also seek the advice of and take into account the opinions of other countries, particularly those in Asia which have been subjected to Communist pressure.

RELATIONSHIP OF DISARMAMENT TO SECURITY

In view of the danger of Communist aggression in specific and remote, but nonetheless vital, areas it is imperative that the United States have the capability to deal with such conflicts having an effect on our national security and involving international commitments.

Further study is needed on the effect certain disarmament proposals, if adopted, would have on United States national security.

FORMULATION AND ORGANIZATION OF UNITED STATES DISARMAMENT POLICY

The subcommittee commends the President for his action in appointing in 1955 a special assistant for disarmament policy. The subcommittee, however, agrees that the formulation and execution of disarmament policy is primarily the responsibility of the Department of State. The Office of Disarmament in the Department should be adequately staffed and its head should have sufficient authority and funds to carry out his assignment.

Public appraisal of United States disarmament policies, to be effective, should be based on adequate knowledge and the subcommittee advises that a greater amount of information should be forthcoming from the executive branch.

ECONOMIC ASPECTS OF ARMS CONTROL

The primary impetus for the prosperity and growth of this nation does not rest on defense spending, although a substantial reduction in armaments would have an impact on the economy. A disarmament agreement which was based on current proposals of the United States would probably not result in large savings in expenditures for defense. However, Government agencies should be encouraged to devote more

time now to a study of how to meet specific problems which might occur if a large cutback in defense spending were to take place.

III. The Need for Disarmament

The need to make progress on controlling and reducing armaments is more apparent today than ever before. No one would dispute that the discoveries and inventions of science in the last decade have produced weapons which are so destructive that the human mind can hardly contemplate what the world would be like if they were used in war. The atomic bomb used in 1945 on Hiroshima was a 20-kiloton bomb, the equivalent of 20,000 tons of TNT. It caused 150,000 casualties in an area of 5 square miles. This weapon was then the most destructive the world had ever known. Today, however, the Hiroshima and Nagasaki bombs are small as compared to the largest weapons in our stockpile. In 1954, nuclear weapons tests of the United States revealed that 1 explosion contained a blast that was vastly greater than the bombs used 9 years earlier. Possession of nuclear bombs now resides in the Soviet Union and the United Kingdom as well as the United States. Furthermore, the radiation resulting from these large bombs would cause damage not only to the thousands of people in the immediate vicinity of the explosion but perhaps would cripple and maim future generations.

Some military and political leaders have found consolation in the great firepower of the new weapons. They have reasoned that when war becomes so brutal for all sides, nations will be reluctant to commit aggression for fear an attack would spread both in area and in type of weapons used. Thus, the concept of nuclear deterrence has grown and has been considered to date one of the chief elements in the preservation of world peace.

Nuclear deterrence as a means of maintaining our national security has its limitations. One definite limitation is that the number of countries with nuclear weapons in their possession will undoubtedly grow. At present only three countries manufacture them. It is not known whether the U. S. S. R. has loaned or given these weapons to other countries but the United States and the United Kingdom thus far have not. But other nations are quickly gaining the knowledge with which to produce fissionable materials and some already have the industrial capability to manufacture them. As nuclear weapons are spread throughout the world the likelihood of their use in war increases.

The idea of nuclear deterrence implies a degree of rationality. It assumes that the leaders of a government realize that their own country cannot escape the catastrophe of nuclear war and that, consequently, they strive to prevent it from occurring. If nuclear weapons are possessed by many countries with different types of governments, the element of rationality would be reduced. In some cases, there might be the temptation to use such weapons without due concern for the consequences.

Another drawback of the reliance on nuclear deterrence is the advancement of military technology. The large powers, particularly, are engaged in an unending race for weapons; weapons not only growing in destructiveness but against which there is little or no defense. Thus, there exists today a race to produce an intercontinental ballistic missile which will transcend continents at a speed of 15,000 miles

per hour and once launched will land at its destination in a matter of minutes. The Soviet Union has just announced that it has successfully tested such a missile and the United States is working toward that end. With such weapons in the arsenals of the major powers, even a small mistake or miscalculation could embroil the world in an all-out holocaust. The fact that these missiles are being perfected makes disarmament of the greatest urgency.

Finally, an indefinite race for military superiority among nations constitutes a tremendous use of resources. For example, about half the research carried on in the United States is for military purposes.[2] In the Soviet Union a large percentage of the production of basic raw materials goes into the manufacture of weapons. Production of items for defense increases the cost of living. Diversion of vital goods and services year after year into nonconstructive projects hinders people everywhere from enjoying a better and more prosperous life.

RECOGNITION OF THE NEED FOR DISARMAMENT

The need for progress on the control of the new weapons was recognized by the United States at the end of World War II, shortly after the first atomic bomb had been produced. In this country we gave clear intention of our desire for arms reduction and control by offering to submit the control of atomic energy to international authority. This country announced to the world through the forum of the United Nations that we would give up our monopoly in the production of atomic energy. This offer was rejected by the Soviet Union.

Subsequently, the United States has been meeting periodically with the Soviet Union and other countries in an effort to negotiate an effective disarmament agreement. Many proposals for arms control have been set forth and discussed among the major powers, but always when the time for decision arrived the Soviet Union refused to consider them seriously and thus the negotiations came to naught.

In recent months, however, the Soviet Union has appeared to indicate a greater interest in reaching some agreement on arms control, although the cold war propaganda tactics of the U. S. S. R. and its activities to foment strife and agitation in key areas have not abated. This has been the impression gained by representatives of the United States, the United Kingdom, France, and Canada, the four nations meeting with the Soviet Union as the subcommittee of the United Nations Disarmament Commission.[3] The Soviet Union appears to have abandoned, whether permanently or temporarily is not known, certain demands that were completely unacceptable to the other four countries on the United Nations subcommittee. These demands included insistence on the withdrawal of all United States troops from other countries and the dismantling of all military bases being operated on foreign soil. The Soviet Union also had called for a ban on atomic bombs, the destruction of all nuclear weapons stockpiles, and the reduction of armed forces and nonnuclear armaments without including provisions for inspection and control. In other words, the Soviet Union refused to accept or even consider a disarmament

[2] In a speech, August 26, 1955, Secretary of the Air Force Quarles stated that the research and development program of the Federal Government, of which 35 percent is for national security, absorbs more than half of that conducted in the country.

[3] For a discussion of the disarmament negotiations conducted under the auspices of the United Nations, see staff study No. 3 of the Senate Disarmament Subcommittee, Control and Reduction of Armaments—A Decade of Negotiations, 1946–56. July 1956.

agreement that would provide guaranties to each party that the agreement was being observed and carried out.

Such demands on the part of the U. S. S. R. would have destroyed the major defenses of the United States and would have placed the security of this Nation and nations allied with it in grave peril. So long as the Communists persisted in making unreasonable proposals, the United States could not make any headway in stopping the arms race or the threat of war. That the extreme and unreasonable proposals of the Soviet Union have not been repeated in recent months has helped to improve the situation to some extent. Only time and events can tell whether the Soviet Union, for whatever reason, is negotiating in earnest.[4] Whether internal pressures reflecting the inability of the Soviet system to furnish both guns and butter is having an influence on Soviet disarmament policy must still be determined. The subcommittee is compelled by the history of our attempts to negotiate with the Soviet Union to observe that the prospects for any early and meaningful agreement are not encouraging. This should not deter us, however, from exercising sincere and persevering patience toward the goal of achieving an effective arms control agreement. Specifically, we should pursue our efforts toward achieving the reduction and control of armaments in the United Nations General Assembly.

IV. Relationship of International Tension to Armaments

The subcommittee, in its study of disarmament, found that two basic approaches are offered to halt the armaments race. One approach considers that armaments are primarily a symptom and not a cause of the existence of international tension. According to this approach, before armaments can be reduced the disputes must be settled and the tensions must subside. Negotiations on armaments reduction and control are thought to be fruitless until political disputes are resolved; arms reduction would thus follow automatically. If political differences cannot be worked out then it is considered futile to expect that the arms race can be halted.

A second basic approach differs from the above in that it adopts the premise that armaments are often a cause of tension and not merely the result of it. Proponents of this approach believe that efforts to reduce armaments must be attempted irrespective of progress on solving political questions. According to this argument, nations must learn to settle their differences through peaceful means and not through war. Proper arms-control measures, in addition to reducing the burden of armaments, may promote the settlement of outstanding political issues by creating a more temperate atmosphere.

It is the view of the subcommittee that these two approaches should not be considered mutually exclusive. Each has validity. It is not necessary to choose one above the other, but to decide the extent to which the two approaches may be pursued simultaneously, how far progress in one area can be made without corresponding progress in the other, and whether the methods by which the two approaches are sought may be independent or must be joined.

There is no single road to peace. Many paths must be explored. Reducing international tension and diminishing the threat of war

[4] See staff study No. 8. Control and Reduction of Armaments—Attitudes of Soviet Leaders Toward Disarmament. June 6, 1957. See also pts. 5 and 11 of the hearings of the Subcommittee on Disarmament.

should be pursued both through efforts to settle political problems and through negotiations to curtail and control armaments. Neither approach alone, in the opinion of the subcommittee, is sufficient.

Substantial reduction of armaments cannot be made without corresponding progress on the resolution of at least some political issues. Nations have yet to adopt and follow common standards of international behavior. Therefore, the possession of armaments is still considered to be a principal means of protecting a country's vital interests.

On the other hand, to await the solution of all political problems before proceeding to attempt the control of armaments is unrealistic and can be dangerous for the future security of this country and, indeed, the world. It is unrealistic, because many of the political problems confronting the world today are so basic that solutions, if they come about at all, can only occur gradually. It can be dangerous, because as time goes on the armaments race is continued at an accelerated pace, and the threat of nuclear catastrophe becomes more acute.

In the view of the subcommittee the conflict between the free democratic world and the Communist totalitarian world is too fundamental to expect a settlement within the foreseeable future. We cannot blind ourselves to the persistence, if not permanency, of the Communists' quest for world domination. What we must try to do is to diminish or halt the arms race on the premise that limited and safe measures will in themselves help to reduce world tension.

It appears to the subcommittee that some of the outstanding political problems are impeding substantial progress on disarmament. That is, before the armaments of the United States and other powers can be reduced beyond a limited amount some progress must be achieved on these political problems. In Europe the major problem is the division of Germany. In the Far East the most pressing problem is Communist China.

PROBLEM OF GERMANY

Germany today is a divided nation. One-half is thriving economically and is governed by democratic processes. The other half is dominated by a Communist regime bolstered by the presence of 300,000 Soviet troops. The German people want and need to be unified, not under the control of a foreign power but in freedom as a sovereign and independent nation.

The Soviet Union has refused to agree to the unification of Germany. It has professed to fear a resurgence of German militarism which only a few years ago brought such misery and destruction to the European Continent, including major portions of the Soviet Union. The Soviet leaders have fought the rearmament of Germany and its entry into the North Atlantic Treaty Organization.

Much of Soviet protestation about German unification is sheer wailing about the ability of the West to erect a bulwark against Communist aggression. The buildup of NATO strength, which is being enhanced by German participation, has been a vital factor in preserving the peace and freedom of Western Europe. It is understandable, however, that the Soviet Union is reluctant to see Germany become once again a strong European state.

The subcommittee believes that the United States, the Soviet Union, the United Kingdom, and France along with Germany should at an early date make a renewed effort to negotiate on German reunification.[5] We should determine whether any basis exists for a reconciliation of what heretofore have been diametrically opposed stands of the Western Powers and the Soviet Union on the German question. In making this effort it is apparent that the western nations, including the United States which has such a strong stake in the security of Europe, must be prepared to envisage that a Europe with a united Germany would be different from what it is today. Certain principles are suggested by the subcommittee as ones which would serve United States interests as well as the interests of the countries of Europe.

These principles should be viewed as being inseparable. The achievement of a free and reunified Germany would probably involve some ceiling on the size of its armed forces and its supply of armaments. Such restrictions to be binding, however, must be accompanied by similar restrictions on the armed forces and armaments of other nations in Europe as well as the United States and the Soviet Union. These restrictions should apply to the European NATO countries and the Warsaw Pact countries of Eastern Europe, and would involve relocation and possible reduction of Soviet forces in Eastern Europe and United States forces in Germany.

If United States forces were to be withdrawn from Germany provision would need to be made for stationing them elsewhere on the eastern side of the Atlantic so long as NATO military strategy requires it.

Restrictions on armed forces and armaments would involve the establishment of an adequate inspection and control system to insure not only that a surprise attack could not take place but also that the restrictions agreed upon were being observed.

New security arrangements such as an all-European security treaty based on limited disarmament measures and a united Germany must presuppose no diminution of the military strength of NATO in Western Europe relative to the military strength of the Warsaw Pact powers.

The subcommittee realizes it will be difficult to translate these principles into specific proposals to which all the countries involved could subscribe. Nevertheless, if German reunification is to become more than a slogan, Western policy must be both persistent and realistic. Neither the Western Powers' nor Soviet policy on German unification appears to be sufficiently flexible to encourage progress toward the solution of this problem.

THE PROBLEM OF COMMUNIST CHINA

Since 1949, when the Communists took control of the Chinese mainland and the Nationalist Government retreated to Taiwan, the nations of eastern and southern Asia have been unable to achieve a secure peace. The Chinese Communists have consistently ignored the decent practices of the international community by using force, threats of violence, and by mistreating the citizens of the United States and other countries detained in China and by refusing to allow them to return home.

[5] Previous proposals for European security and the reunification of Germany are discussed in staff study No. 5 of the Subcommittee on Disarmament, Disarmament and Security in Europe, December 1956.

Communist China has by far the greatest concentration of military power in eastern and southern Asia. It has not been satisfied with this but has striven constantly to augment this power. Relatively, other nations in the area are lightly armed and the United States, in view of Communist aggressive activities which might endanger our security, has been compelled to establish bases and to aid in strengthening the defenses of countries in the area.[6]

The United States could not sign an agreement with the Soviet Union and other nations to reduce substantially its Armed Forces and armaments while the ruling group in Peiping persists in increasing tension through the use of force and threats of violence. Before substantial steps can be taken to reduce armaments in Asia, the Chinese Communist government must demonstrate an intent to live in peace with other nations. Until that time, the United States must not weaken its defenses in the area.

INTERNATIONAL TENSION IN OTHER AREAS

The division of Germany and the aggressive nature of the Chinese Communists do not constitute the only political problems which account for the present state of international tension. The captive countries of Eastern Europe, the disputes of the Middle East, the endeavor of colonial peoples to achieve self-government, the division of Korea and Vietnam, the conflict between India and Pakistan over Kashmir, and certain longstanding disputes between two or more Latin American countries deserve to be listed among the problems which cause nations to maintain or seek to augment their military establishments.

In all of the above cases as well as others which have not been mentioned, the primary need is to resolve the conflict as peaceably as possible. The United States cannot always inject itself into the settlement of these disputes, but we can as a nation strive to develop policies which will reduce the likelihood that force will be used and which will promote the cause of peace, freedom and justice.

The subcommittee believes that the United States may help to reduce international tension in many areas in at least three basic ways. First, we should work through the United Nations, when appropriate, to evolve peaceful and cooperative measures to settle disputes on an equitable basis. In some cases a welcome step toward this end would be the extension of international legal methods to cover disputes now handled primarily as political grievances.[7] Such a step is long past due in international affairs. Although disputes among nations have by no means decreased in recent years, the number referred to international law seem to be diminishing rather than increasing. This trend, if it continues, holds little hope that nations will increasingly solve their differences by objective international standards of justice.

Second, we should seek in the United Nations the continuance and, if possible, the extension of the use of limited arms control measures in areas highly charged with tension. In four areas of the world in which armed conflict has taken place in recent years—Korea, Viet-

[6] For a discussion of United States defense strategy in Asia and the effects of current disarmament proposals on this strategy, see staff study No. 9 of the Subcommittee on Disarmament, Disarmament and Security in Eastern and Southern Asia, July 1957.

[7] For a good discussion of this point, the subcommittee is indebted particularly to the testimony of the late George A. Finch, hearings of the Subcommittee on Disarmament, pt. 11, January 9 1957.

nam, Kashmir, and the Middle East—the subsequent armistice agreements provided for various limited arms control measures. One of these was the demilitarized zone, an area a few miles deep which acted to separate the troops of the two sides.[8] In Korea and Vietnam the existence of a demilitarized zone definitely helped to prevent a resumption of hostilities. It should be extended to other areas, where the proximity of rival forces threatens to lead to armed conflict.

Another arms control measure that has merit is the use of an international police force. The subcommittee notes the success that the United Nations Emergency Force has had in preventing further conflict between the Arab States and Israel. A similar type of force could be deployed profitably in other areas where a patrol, inspecting, and separating agency is necessary.

Limited arms control measures may also be effective where a danger exists of an armaments race among powers in a specific region. Except for the major powers, most nations do not produce their own weapons for defense. They must receive them from the larger powers because modern armaments can be produced only by industrialized countries. The supply of armaments to other nations on the part of the major powers brings with it a high degree of responsibility. The United States places controls on the export of armaments, although in recent years our Government has spent several billions of dollars to increase the defensive capabilities of nations particularly susceptible to Communist aggression.

When armaments are distributed to nations in areas in which there are rivalries and unsettled political problems, the buildup of armaments may increase the tension. The United States has been under considerable pressure to send arms to individual nations in many parts of the world,[9] particularly since the Soviet Union embarked on its program to supply armaments to areas in which it is to its advantage to promote strife and conflict.

An additional factor which helps to foster an armaments race among less industrialized countries is the vast and accelerated technological race among the major powers. Armaments produced by the United States, for example, often become obsolescent within a few years after billions of dollars have been spent on their procurement. Large quantities of arms of the major powers, for example, were discarded in many areas at the end of World War II. The existence of large supplies of expensive but outmoded equipment often contributes to international tension when this equipment is distributed to many countries.

In view of the preceding observations, the subcommittee believes that more attention should be paid in the United Nations to the question of the extent to which the armaments supply contributes to international tension.

V. The Nature of a Disarmament Agreement

The subcommittee believes that international tension can be reduced both through the settlement of political problems and through agreement to control and limit armaments. After arriving at this con-

[8] The efficacy of demilitarized zones is discussed in staff study No. 6 of the Disarmament Subcommittee, Disarmament and Security in the Middle East, and staff study No. 9, Disarmament and Security in Eastern and Southern Asia.

[9] For evidence on the problem of arms traffic, see staff studies 6, 7, and 9 of the Disarmament Subcommittee, on the Middle East, Latin America, and eastern and southern Asia, respectively; and also the testimony of John C. Elliott in pt. 12 of the subcommittee's hearings, January 17, 1957.

clusion the subcommittee inquired into the type of disarmament that might be possible in the current world situation. In this task it has profited greatly from the suggestions of many private groups and individual citizens who have been keenly interested in one or more aspects of the problem.[10]

Coincident with the preparation of this report negotiations have been going on in London where four Western nations and the Soviet Union have been attempting to reconcile their points of view with respect to arms-control measures. Although the subcommittee has been deeply interested in these negotiations it has not restricted its study to them. Rather, it has tried to gain a broad perspective over the entire gamut of arms-control possibilities.

At this point in its report the subcommittee must emphasize one vital relationship between disarmament and the United States Defense Establishment. This is the need to maintain the military strength of this country to protect and defend the national interests of the United States while negotiations on disarmament are in progress. To give the disarmament talks their best chance of success the United States must maintain its military posture. We must not undertake to disarm unilaterally and thereby weaken our ability to defend ourselves and our allies against aggression, should it occur. If the Communists thought that we were being influenced to disarm unilaterally, one of the incentives for them to negotiate in earnest would be removed.

SCOPE OF A DISARMAMENT AGREEMENT

Throughout the many discussions of past disarmament negotiations, especially those held in the early 1930's, the nations involved endeavored to formulate a comprehensive and highly technical disarmament agreement covering the whole range of weapons and weapons systems. In the early post-World War II period, the discussions likewise have been technical and have been based on comprehensive proposals. The subcommittee believes that although it is essential to construct blueprints for a comprehensive plan, it is a mistake to expect that the problem of disarmament can be solved in one sweeping overall agreement, and that technical negotiations can succeed when the element of trust and confidence does not exist among the major powers. It seems highly unrealistic to expect that nations having little respect for each other's integrity and with deep ideological differences will consent to set aside a major portion of their armaments and base their security primarily on a comprehensive international agreement.

If the major powers are to succeed in the enormous task of reducing their armaments, it is the judgment of the subcommittee that success can come gradually, a step at a time. A limited disarmament agreement has the advantage of testing the good faith of the parties without, so to speak, putting all our security eggs in one basket. It may act as a partial brake in the armaments race and as a result reduce international tension sufficiently to allow the major powers to negotiate on some political problems. At the same time a limited agreement can gage the extent to which control measures should be instituted in subsequent arms control treaties and the degree of accuracy necessary

[10] Many proposals of private citizens and groups are contained in the published hearings of the Subcommittee on Disarmament. See particularly pts. 3, 5, 8, 9, 10, 11, and 12. For a summary of many of the suggestions received through hearings and correspondence see the Second Interim Report of the Subcommittee on Disarmament, Report No. 2829, 84th Cong., 2d sess., September 7, 1956.

for them to be effective. Any limited agreement must, however, be related to an overall comprehensive plan. It cannot and should not be judged alone.

CONTROL MEASURES IN DISARMAMENT

The subcommittee believes that a disarmament agreement should not rely on the good faith of the parties to it. This means that the agreement must contain measures to determine whether every provision is being carried out.

One way to determine whether an agreement is being observed is through intelligence. Every nation endeavors to learn the secrets of potential adversaries and, consequently, seeks to collect information. In secret and closed societies, intelligence is often an important way to secure knowledge about the operations and policies of the Government. It is a poor device, however, for determining the observance of a disarmament agreement. To rely exclusively on intelligence estimates which may be exaggerated and inaccurate would, in the opinion of the subcommittee, be ineffective and would increase suspicion and distrust.

Another way of determining performance under a disarmament agreement is through provisions the observance of which would be self-evident; that is, if a part of the agreement were disregarded the violation would be known to the world automatically. One type would be an agreement to suspend or limit the testing of nuclear weapons down to a certain size. Instruments now located outside the Soviet Union, for example, register many of the tests conducted within that country. A violation of an agreement to suspend tests down to a given size, therefore, would very likely be detected. However, an issue which might arise would be whether a particular explosion was above or below the ceiling established. An agreement to suspend or ban provisionally all tests would probably require the detecting instruments to be located throughout the countries and areas in which testing might take place.

Another such proposal would be an agreement to withdraw forces from foreign territory. For example, when the Soviet Union agreed to a peace treaty with Austria and withdrew its troops from that country the Austrian people knew and made known to the world that this was being done. The Soviet Union could not reenter Austria with troops without such a move being disclosed to the Austrian people, and hence to all free governments. A similar situation would apply in the event that the Soviet Union withdrew its troops in Eastern Europe and then tried to reenter.

The most effective way to insure that an agreement is being observed is through inspection. Most of the proposals advanced by the United States in recent disarmament negotiations have included inspection provisions. For example, to assure the observance of a ban on all atomic weapons tests, the executive branch has stated that the parties to the agreement would need inspection teams and detecting instruments placed near their test sites. It has also declared that an agreement to prohibit the future production of fissionable materials for weapons purposes would require an inspection system set up in atomic energy plants.

The United States has also proposed measures to guard against a surprise attack on the part of any one of the major powers. These

measures include aerial surveys and ground inspection of all or parts of the Soviet Union in exchange for inspection of all or parts of the United States and perhaps parts of other areas as well.

These various proposals for inspection would, in the opinion of the subcommittee, go a long way toward insuring that the Soviet Union or any other party to the agreement could not violate it surreptitiously. Thus, with a proper control system, even an untrustworthy nation could not hide under the provisions of an agreement and conceal plans for aggression. This principle has been supported by the former Chairman of the Joint Chiefs of Staff, Adm. Arthur W. Radford, who told the subcommittee "that the element of trust would be eliminated by a proper control system." [11]

EXTENT OF INSPECTION UNDER A DISARMAMENT AGREEMENT

The subcommittee has concluded that a disarmament agreement must include measures to test the observance of its provisions. Measures for inspection, adequate to safeguard each separate disarmament proposal in the package may, however, when added together, be so extensive as to be impractical or unacceptable. The arguments against comprehensive disarmament proposals apply also to comprehensive inspection plans. Inspection of United States and Soviet territory by foreign personnel has never before been tried. It would require detailed arrangements regarding the number of inspectors, the objects of their inspection, their location and authority, and their privileges as foreign agents.[12]

The subcommittee does not wish to usurp the negotiating function of the executive branch by recommending specific proposals entailing inspection and verification under a disarmament agreement. The subcommittee is recommending as a policy that if a first step disarmament agreement is to be realized it should be limited both as to the armaments being curtailed and as to the amount of inspection to be included.

Representatives of the executive branch have stressed before the subcommittee that they are advocating limited and partial measures.[13] The executive branch has advanced so many separate disarmament proposals, each with its accompanying necessary inspection measures, that the total of such inspection may be unacceptable and also unworkable in a first step disarmament agreement; but it is correct, in the opinion of the subcommittee, in insisting that each disarmament provision be susceptible to verification. If a disarmament agreement is to contain some degree of inspection it is essential that the details of the inspection be properly worked out. In other words, acceptance of the principle of inspection by the parties to the agreement is not the same as agreement on the implementation of it.

The details of inspection, as our experience in Korea proved, are extremely important. In the Korean armistice agreement both sides accepted inspection. But aerial inspection was banned and the Communists deliberately sabotaged all attempts to make the ground inspection teams effective.[14]

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[11] Hearings of the Subcommittee on Disarmament, pt. 4, March 15, 1956, p. 174.

[12] For a discussion of some of the problems of inspection see staff study No. 4 of the subcommittee, Technical Problems, October 1956.

[13] See testimony of the President's special assistant for disarmament in pt. 1 of the hearings of the Subcommittee on Disarmament, January 25, 1956.

[14] See testimony of Arthur Dean, pt. 11 of the hearings of the Subcommittee on Disarmament, January 9, 1957; also, Staff Study No. 9, Disarmament and Security in Eastern and Southern Asia.

In view of the importance of inspection, the subcommittee believes the executive branch must be adequately prepared regarding the requirements of specific inspection proposals. The subcommittee has received to date few details from the executive branch on inspection provisions. It has been unable to learn, for example, how a ground inspection system would operate to guard against surprise attack. The subcommittee has learned, however, that if certain types of inspection regarding nuclear materials were accepted now by the major powers, the United States, specifically the Atomic Energy Commission, would not have a sufficient number of inspectors to carry out the inspection program.[15]

The subcommittee strongly recommends that if inspection plans have not yet been prepared, an effort be made promptly by the executive branch to draw up blueprints for various types of inspection systems now under consideration. The subcommittee would be interested in seeing what would be the structure, the functioning, and the cost of a worldwide inspection system. If the executive branch finds that preparation for inspection requires appropriations, the subcommittee believes that recommendations to that effect should be made to the Congress.

THE RISKS IN A DISARMAMENT AGREEMENT

The details of an inspection system are important because of the need to minimize the risk involved in any agreement to cut back and control armaments. Examination of numerous disarmament proposals reveals none that can be said to be absolutely foolproof against evasion. Studies undertaken and hearings held by the subcommittee point to the conclusion that it would be deceiving to the American people and the people of the world to advertise any plan as perfect.

Every proposal entails risks; risks as to the possibility of clandestine evasion and as to military security. The question is not one of finding an ironclad inspection formula but of adopting arrangements that will satisfy the defense needs of the country. In essence, the subcommittee believes that the basic question is to decide whether the risks of doing something to curtail the threat of war by reducing armaments are less than the risks of doing nothing and allowing the armaments race to continue indefinitely. When all of the advantages and disadvantages of these two courses were weighed, the subcommittee found that the risks of doing nothing are so much greater than the risks of doing something that the country must proceed to find ways to control the weapons of war. We must try to obtain the most secure agreement possible, which will give this country and the free world a greater degree of security from war than now is the case.

ENFORCEMENT

The subcommittee inquired into the matter of enforcement provisions in a disarmament agreement. Enforcement refers to the recourse of nations which abide by a disarmament treaty against those which do not. Many proposals for enforcement have been suggested to the subcommittee including the use of political and

[15] Pt. 4 of the hearings of the Subcommittee on Disarmament, testimony of Admiral Strauss, March 7, 1956, p. 131. The problem of obtaining sufficient inspectors is also discussed by Lt. Gen. Leslie R. Groves in pt. 11 of the subcommittee hearings.

economic sanctions, moral condemnation, and an international police force or army. Some would give power to an international body to impose penalties if a party to a disarmament treaty failed to abide by its treaty commitments.

It is the conclusion of the subcommittee that under present world conditions a disarmament agreement among the major powers could not be guaranteed by enforcement measures. There is little that can be done, short of war itself, to police the big powers. Consequently, an agreement for the control and reduction of armaments must remain in force primarily through mutual advantage.

Compelling compliance with arms control measures on the part of smaller powers is also difficult. Experience with enforcement of treaty obligations up to the present has been disappointing. If any sanctions or penalties are made a part of an agreement, they should be entered into with the realization that it would be better to have no enforcement provisions rather than to have some which would be ignored. In the first stage of disarmament, enforcement must rest not on the power of international bodies but on agreements which are mutually advantageous and which contain effective inspection provisions.

INCLUSION OF OTHER COUNTRIES IN A DISARMAMENT AGREEMENT

Many of the proposals being advanced by governments as well as individuals and groups envisage a disarmament agreement among many nations. France, the United Kingdom, and Canada, in addition to the Soviet Union and the United States, are members of the United Nations Disarmament Subcommittee. These three countries would be affected by at least one of the major disarmament proposals now under consideration.

It is essential, in the opinion of the subcommittee, that the United States continue to cooperate fully with its allies on the Disarmament Subcommittee. Furthermore, since Europe has become associated with various disarmament plans it has been necessary for the United States to consult with countries belonging to NATO.

The executive branch should also take into account the opinions of nations outside of Europe, especially those in eastern and southern Asia. Many of these nations have been the victims of Communist aggression and many have taken strong positions on various disarmament proposals. Moreover, the Communists are attempting to convince Asian countries that it is the Soviet Union and Communist China that are peace-loving and that the United States is opposed to peace. The United States, therefore, ought to give weight to Asian opinion as well as to inform the people and governments of this vast area of our efforts to remove international tension and our endeavors to get the Soviet Union to accept effective control over the weapons of war.

VI. Relationship of Disarmament to Security

A very important aspect of the disarmament problem is the effects a disarmament agreement would have on the composition and capabilities of the United States Defense Establishment. The subcommittee has previously stated its belief that a disarmament agreement, if one is achieved, should be limited in scope. That is, much of the hardware of United States and Soviet armed forces would remain

intact. The extent of any reductions, however, cannot be known until an agreement is actually signed. Therefore, the subcommittee is not in a position to reach concrete conclusions as to how our military requirements would be affected. However, on the basis of proposals currently being discussed the subcommittee believes certain questions should be raised at this time regarding United States defense strategy.

PROBLEM OF LIMITED WARS

Almost all of the disarmament proposals being advanced by the United States deal with the problem of preventing a surprise attack and controlling or diminishing the threat of large-scale nuclear warfare.

The threat of an attack on the United States with nuclear weapons, however, is not the only, and probably not even the most likely, form in which a future war might start. War does not always, in fact does not usually, begin with one extensive and devastating attack. Aggression begun in a limited and often remote area has been used frequently by the Communists in the post-World War II era. Limited warfare has also taken place as a result of political conflicts among non-Communist countries. Many witnesses before the subcommittee have stressed these points. They asserted that a very real danger exists of limited wars and small aggressions.[16]

It appears to the subcommittee that the record has shown that the danger of wars beginning in specific and limited areas is particularly acute. In the absence of efforts in the disarmament negotiations to consider the problem of limited wars, it is imperative, in the view of the subcommittee, that the United States have the capability to deal with a limited war which affected its national security and international commitments.

In this connection one of the gravest questions raised before the subcommittee is whether the United States has the military organization and weapons with which to help defend its allies from a localized Communist aggression. Witnesses who appeared before the subcommittee and authorities cited in the staff studies have argued that the United States has placed too much emphasis on large-scale nuclear retaliation. They have charged further that we have not developed enough small tactical type nuclear and nonnuclear weapons which could be used in small, but nevertheless vital, conflicts in which the Communists would be attempting to nibble away at the free world piece by piece.[17] At least one witness has gone so far as to argue that the United States has not produced sufficient fissionable material for small nuclear weapons and, therefore, should not enter into a disarmament agreement at this time in which production of fissionable material for weapons purposes would be prohibited.[18]

Such charges, the subcommittee believes, are most serious. The questions raised by them should not remain unanswered. The subcommittee believes that further study is required regarding the effects certain disarmament proposals, if adopted, would have on United States national security.

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[16] See the subcommittee hearings, testimony of Richard Leghorn, pt. 3; Paul Nitze, pt. 11, and Thomas Finletter, pt. 12.

[17] Ibid. See also staff studies No. 5 and No. 9 of the Disarmament Subcommittee, cited earlier.

[18] See the testimony of Thomas E Murray, former Commissioner of the Atomic Energy Commission, pt. 6 of the subcommittee hearings, April 12, 1956.

VII. Formulation and Organization of Disarmament Policy

The way in which disarmament is handled as a part of United States foreign policy can further or hinder a successful outcome of disarmament negotiations. The subcommittee, therefore, has reviewed executive organization of disarmament matters for the past several years.[19]

Disarmament, until recently, had been given a rather low priority in foreign policy matters. In a sense this was understandable because the persistence of the cold war made the control of armaments appear to be an evasive goal. In 1955, however, the President appointed a special assistant for disarmament policy. The subcommittee commends the President for this action. His decision placed emphasis on disarmament at a crucial period and was an indication to the world that the United States sincerely and eagerly wanted to find a way to end the arms race. The operation of the Office of Special Assistant did have its drawbacks, however. Disarmament policy appeared to be formulated without achieving the best possible coordination with the Department of State and, therefore, tended to be divorced from other and related aspects of foreign policy. Furthermore there were times when the President's Disarmament Assistant and other officials of the executive branch made conflicting statements about American proposals and this resulted in confusion as to United States policy. In March 1957 the President decided to place the Office of the Special Assistant for Disarmament under the jurisdiction of the Department of State.

The subcommittee agrees that the Office of Disarmament should be maintained within the Department of State. It should be adequately staffed by competent personnel experienced in the various aspects of arms control. The head of the Office ought to be given sufficient authority and funds to carry out his assignment. Among the uses to which funds might profitably be put is the creation of special advisory groups of nongovernmental experts who are especially knowledgeable regarding problems related to disarmament. This has been done to some extent regarding the problem of inspection, but other aspects of disarmament might be treated in this fashion.

The subcommittee believes that although the executive branch has made a considerable effort to resolve the many issues confronting it in formulating disarmament policy, a still greater effort should be made. The President and the Secretary of State should make sure that the head of the Office of Disarmament has the authority and the funds to make this effort. If they are not so confident, then the subcommittee suggests that the President consider whether the Congress should be asked to grant the necessary authority and to appropriate the needed funds.

Cooperation between the Congress and the executive branch on matters of arms control ought to include keeping the Congress informed of new developments and changes in policy. During the course of the subcommittee's study members of the executive branch have appeared before it in advance of, during, or after negotiations of the United Nations Disarmament Subcommittee. Until recently these briefing sessions, although helpful, have not included a description of actual proposals made in the negotiations. Within the last

[19] For a detailed and factual account of this subject, see staff study No. 1 of the Disarmament Subcommittee, The Executive Branch and Disarmament Policy, February 1956.

few weeks, however, the Secretary of State has made arrangements to keep the subcommittee informed of current developments in the disarmament negotiations. The subcommittee believes that these arrangements have been constructive.

The classification of much information surrounding disarmament matters is a cause of concern to the subcommittee. Many aspects of United States weapons policy and defense strategy must remain classified, but the subcommittee believes that the executive branch in its standards of classification and declassification must keep in mind the public's need to know what our policy is and the reasoning and facts which might go into the formulation of disarmament policy.

Private witnesses before the subcommittee complained that the public was not receiving enough information indicating on what principles and facts specific disarmament proposals were based.[20]

Public appraisal of United States policies, to be effective, should be based on adequate knowledge and the subcommittee advises that a greater amount of information should be forthcoming. In this respect, the subcommittee believes that the July 22 public address of the Secretary of State on disarmament is the type of information that is needed.

VIII. Domestic Aspects of Arms Control

Almost any agreement on the control and reduction of armaments would entail adjustments in United States internal domestic policies. The subcommittee has not tried to prophesy the nature of all the domestic implications of disarmament. The subcommittee has outlined some of these aspects and has indicated the type of further study that is needed. The domestic questions fall into two main groupings, economic and legal.

ECONOMIC

The subcommittee is of the firm conviction that efforts to achieve the control and reduction of armaments should not be hampered in any way on the grounds of their economic consequences. The ultimate benefits of disarmament are so great that we must proceed toward this goal despite any momentary problems in the economic sphere.

Expenditures for national security account for roughly two-thirds of the Federal budget. This includes funds for the United States Defense Establishment, the military portion of the atomic energy program, military aid to friendly nations, and the stockpiling of scarce materials. In recent years the amount for these programs totaled in excess of $40 billion annually. The expense of new weapons development has steadily forced the cost of defense upward.[21]

Defense spending not only affects the national budget; it has important influences on the entire economy. Each year some $25 billion is plowed into American industry for the procurement of weapons and for the construction of facilities. Several billions are used for the pay of troops stationed throughout numerous American communities as well as in countries abroad. About half of the research being carried

[20] See, for example, the subcommittee hearings, testimony of Charles D. Coryell in pt. 5, Miss Mabel Vernon in pt. 8, Russell P. Cooper in pt. 9, and the late Evarts A. Graham in pt. 10.

[21] For a discussion of some of the economic aspects of armaments and disarmament see pt. 13 of the hearings of the subcommittee, March 7 and 13, 1957.

on in the country is financed by the defense budget. In view of these factors, it would be foolish to conclude that any substantial reduction in armaments would have no impact on the economy.

On the other hand, the primary impetus for the prosperity and growth of this Nation does not rest on defense spending. Of a total gross national product in 1956 of $427 billion only about 10 percent represented national security expenditures. Dominant forces behind the growth of national income are the large-scale investment programs of industry, residential and industrial construction, the high level of consumer spending, the expansion of foreign trade, and the increasing expenditures of local and State governments.

Moreover, many needs of the American people remain unfulfilled, among them more schools and hospitals, improved road and highway systems, and adequate water resources including power. Expansion of the peacetime activities of many private industries has been held up due to defense requirements. Back accumulated demand for commercial aircraft should be noted. Peaceful uses of atomic energy must also be speeded if this country is to maintain its leadership in an increasingly competitive field internationally.

Almost every American has had to sacrifice a portion of his income to help secure the defense of this country. High taxes have precluded consumers from purchasing numerous articles to enrich their private lives. Large amounts of the earnings of our corporations have supplied the Government with revenue through taxation and thus have caused postponement of new enterprise. The large defense budget has also been a factor in the current inflation.

In the view of the subcommittee the above factors point to the conclusion that a disarmament agreement which permitted a cutback in defense expenditures would provide this country with enormous opportunities. Not only would the citizens of this country benefit from a rechanneling of funds from defense to constructive peacetime projects but the people of the entire world would profit as a result of the vast amount of resources that could be used to ease the burdens of mankind.

The subcommittee realizes that a disarmament agreement based on the proposals currently being advanced by the executive branch would probably not result immediately in large savings, if any, in defense expenditures. Nevertheless, the question of the economic impact of a fairly substantial reduction in armaments should not be ignored. The benefits and burdens of reduced defense spending might fall unevenly over the economy.

The work of the subcommittee revealed that no agency of the executive branch has made efforts to ascertain the economic consequences of a reduction in armaments.[22] The subcommittee believes that some study of this question could profitably be made now. Of particular need is an inquiry into possible adjustments of individual industries which are presently channeling a large part of their production into defense requirements. In this respect private industry and private organizations might make a contribution by undertaking studies of certain key segments of the economy.[23]

Government agencies such as the Office of Defense Mobilization, the Federal Reserve Board, the President's Council of Economic

[22] See the testimony of William McChesney Martin, Jr., in pt. 13 of the subcommittee hearings.

[23] In addition to pt. 13 of the hearings for testimony on economic aspects of armaments and disarmament, see testimony of Kenneth E. Boulding in pt. 8, Oscar F. Litterer in pt. 9, Joseph P. McKenna in pt. 10, and Leon Keyserling in pt. 12.

Advisers, and the Departments of Defense, Treasury, Commerce, and Labor especially should be encouraged to devote more time to determine appropriate policies and programs to be instituted if a substantial cutback in armaments were to occur. The subcommittee would like to see the executive branch showing cognizance of this aspect of disarmament.

LEGAL

Any disarmament agreement should be submitted to the Senate in treaty form. Many of the proposals, if adopted, would probably affect existing United States laws. Consequently, an analysis should be made as to what statutory amendments might be necessitated by the major disarmament proposals under consideration. The subcommittee has not studied in detail this aspect of disarmament but hopes to gather data on it in the future.

IX. Concluding Comments

The subcommittee does not pretend that in issuing this report it has covered adequately all aspects of the disarmament problem which the Senate instructed it to study. Throughout the report the subcommittee has tried to indicate areas which need further examination. Some important areas, however, are barely touched upon. One of these is the question of the radiation hazards of nuclear weapons tests and the use of nuclear weapons in warfare. Although the subcommittee received some able testimony [24] on this problem it felt that more comprehensive treatment of this subject could be handled by the Joint Committee on Atomic Energy. The subcommittee referred the testimony and documentation it had received on this question to the Joint Committee and was gratified when the Joint Committee appointed a subcommittee to inquire in detail into the various conflicting points of view regarding the health aspects of nuclear weapons tests. [25]

The subcommittee deliberately refrained from commenting specifically on all the individual disarmament proposals that have been put forth by the executive branch in the recent negotiations, as well as those advocated by individual citizens and private organizations. The subcommittee has tried rather to indicate the broad outlines on which it believes United States disarmament policy should be based.

Unfortunately, there is much skepticism surrounding the problem of disarmament. Many have tried so many times to solve it without success. But skepticism does not produce leadership. It does not inspire us to study and to explore all avenues of approach. We cannot and must not think that the problem is insoluble. If the United States is to continue to lead in the search for world peace; if we are to diminish the threat of a terrible third world war which hangs so heavily upon us and which requires us to sacrifice so much in the way of human and material resources; then we need the understanding, the inspiration, and the active concern of the American people in all walks of life. The search for peace, freedom, and justice for all mankind must go on.

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[24] See particularly the testimony of Warren Weaver in pt. 12 of the subcommittee's hearings, January 16, 1957; also, the testimony of several scientists who appeared before the subcommittee in St. Louis, pt. 10 of the hearings, December 12, 1956.

[25] See its Summary Analysis of Hearings, May 27-29, June 3-7, 1957, on the nature of radioactive fallout and its effects on man.

APPENDIX

Summary of Activities of the Subcommittee on Disarmament

CREATION OF THE SUBCOMMITTEE

The Senate on July 25, 1955, adopted Senate Resolution 93, 84th Congress, 1st session (extended by S. Res. 185 and S. Res. 286, 84th Cong., and S. Res. 61, S. Res. 151, and S. Res. 192, 85th Cong.), establishing a subcommittee on Disarmament of the Committee on Foreign Relations. Senate Resolution 93 authorized and directed the committee to make a full and complete study of proposals looking toward disarmament and the control of weapons of mass destruction.

MEMBERSHIP

The resolution provided that the subcommittee should consist of six members chosen equally from both parties by the chairman of the Senate Committee on Foreign Relations. It further provided that the Vice President appoint, on a bipartisan basis, 4 members from the Committee on Armed Services, and 2 from the Joint Committee on Atomic Energy. The committee, as first organized, was composed of Senators Humphrey (chairman), Byrd, Sparkman, Pastore, Symington, Barkley, Bridges, Wiley, Hickenlooper, Saltonstall, Knowland, and Bricker. After the death of Senator Barkley on April 30, 1956, Senator Long was appointed to fill the vacant place.

PUBLIC HEARINGS

The subcommittee held 16 days of public hearings published in 13 parts, beginning on January 25, 1956, and continuing through March 13, 1957. An index to the hearings has also been published.

The objectives of the hearings were threefold: (1) to learn from executive witnesses the policy and point of view of the administration; (2) to get the opinions of individual citizens and groups; and (3) to profit by the views and judgments of private citizens and nongovernmental agencies who are particularly competent in some area of the subcommittee's work. Hearings were held in Cambridge, Mass.; Minneapolis, Minn.; St. Louis, Mo.; and Washington, D. C.

In the hearings held outside of Washington the subcommittee embarked on a unique method of approach. This was to seek the cooperation of universities and similar educational institutions. In Cambridge, Minneapolis, and St. Louis, universities acted as hosts to the subcommittee. They undertook to make the necessary arrangements for the hearing and were responsible particularly for inviting in each case a group of specialists to prepare brief papers on certain aspects of the disarmament problem. Thus, the subcommittee was

able to profit in these hearings from the work of scholars and technicians as well as to obtain a cross section of public thinking.

A total of 135 witnesses appeared before the subcommittee and 16 statements were submitted for inclusion in the record.

STAFF STUDIES

One of the early studies released by the subcommittee was entitled "Disarmament and Security: A Collection of Documents, 1919–55." This volume, totaling 1,035 pages, brings together documentation on the questions of armaments control as they relate to security. It was designed to facilitate the inquiry of the Subcommittee on Disarmament into the problem.

In addition, the subcommittee has released nine staff studies which relate to various aspects of the disarmamemt problem and which furnish factual information relating thereto. These studies have been prepared under the direction of the subcommittee staff, with the cooperation of the Legislative Reference Service of the Library of Congress. They are as follows:

No. 1. The Executive Branch and Disarmament Policy (February 1956).
No. 2. Disarmament, A Selected Chronology, January 1, 1918–March 19, 1956 (April 1956).
No. 3. Control and Reduction of Armaments—A Decade of Negotiations, 1946–56 (July 1956).
No. 4. Control and Reduction of Armaments: Technical Problems (October 7, 1956)
No. 5. Disarmament and Security in Europe (December 11, 1956)
No. 6. Disarmament and Security in the Middle East (March 17, 1957)
No. 7. Disarmament and Security in Latin America (May 12, 1957)
No. 8. Attitudes of Soviet Leaders Toward Disarmament: Replies From Experts on the Soviet Union to Subcommittee Questionnaire (June 6, 1957)
No. 9. Disarmament and Security in Eastern and Southern Asia (July 8, 1957)

REPORTS

Two reports were made by the subcommittee prior to this report: the first interim report published January 17, 1956, and the second interim report published September 7, 1956.

CORRESPONDENCE

Throughout the course of its existence, the committee has been in communication with private individuals and organizations vitally concerned with the problems of disarmament. Many of these letters contained useful suggestions and constructive comments on problems of arms control. Insofar as representative views received from the correspondents is concerned, see pages 6–13 of the second interim report referred to above.

SUBCOMMITTEE STAFF

The subcommittee staff has been small in number. The work of the staff has been conducted under the general direction of Carl

Marcy, chief of staff of the Committee on Foreign Relations. Mary Ann Sames, of the committee staff, has also devoted a considerable amount of time to the subcommittee's projects.

Francis Valeo* served as staff director of the subcommittee until September 1956 and was followed by Betty Goetz. Other members of the staff were Ellen C. Collier,* Charles R. Gellner,* Dan Jacobs, Janie E. Mason,* Carolyn F. Smith,* and Paula Underwood. In addition, members of the Legislative Reference Service of the Library of Congress, who have assisted the subcommittee in specific projects, are: Rosita Rieck Bennett, Carlile Bolton-Smith, Virginia Brewer, Reno Conti, Charles H. Donnelly, Mary Fulton, Fred Greene, Halford L. Hoskins, J. Clement Lapp, Allan Nanes, Mary G. Shepard, and Joseph Whelan.

Financial statement

Resolution authorizing subcommittee	Congress	Period covered	Funds authorized	Expenditures
S. Res. 93	84th	July 25, 1955, to Jan. 31, 1956	$25,000	$12,242
S. Res. 185	do	Feb. 1 to July 1, 1956	35,000	48,896
S. Res. 286	do	July 1, 1956, to Jan. 31, 1957	32,000	
S. Res. 61	85th	Feb. 1 to June 30, 1957	30,000	20,000
S. Res. 151	do	July 1 to Aug. 31, 1957	10,000	[1] 6,500
Total expenditures as of Aug. 31, 1957				87,638

[1] Estimated.

*On loan from the Legislative Reference Service of the Library of Congress.

CONTROL AND REDUCTION OF ARMAMENTS

SECOND INTERIM REPORT

SEPTEMBER 7, 1956

31345 O—58——6

FOREWORD

The Committee on Foreign Relations transmits herewith to the Senate a second interim report of the Subcommittee on Disarmament, created pursuant to the terms of Senate Resolution 93, 84th Congress, 1st session, and continued by Senate Resolutions 185 and 286, 84th Congress, 2d session. Permission to file this report during the adjournment of the Congress was granted in the Senate on July 23, 1956.

This report is submitted to the Senate by Senator Hubert H. Humphrey, chairman of the subcommittee.

84TH CONGRESS } SENATE { REPORT
2d Session } { 2829

CONTROL AND REDUCTION OF ARMAMENTS

SEPTEMBER 7, 1956.—Filed under authority of the order of the Senate of JULY 23 (legislative day, JULY 16), 1956, and ordered to be printed

Mr. HUMPHREY, from the Committee on Foreign Relations, submitted the following

INTERIM REPORT

[Pursuant to S. Res. 93, S. Res. 185, and S. Res. 286, 84th Cong.]

I. INTRODUCTION

The year 1955 was an important milestone in the efforts of nations to bring about the control and reduction of armaments. Both this country and the Soviet Union recognized that neither nation could emerge unscathed from a war waged with nuclear weapons, weapons which both sides have continued to stockpile. As the President stated:

> War does not present the possibility of victory or defeat * * * only the alternative in degrees of destruction.

The United States and the Soviet Union also recognized that nuclear weapons once produced and stockpiled could not be detected by any system of inspection now known, although inspection to prevent a great surprise attack was still feasible. With the rapid development of new weapons, moreover, the problems of inspection for the latter purpose would become vastly more complicated and perhaps impossible. At best, nations would be far less able to devise agreements to insure that a nation was in fact living up to its disarmament commitments and not instead secretly preparing for war.

These developments probably account for the increased efforts devoted to disarmament in 1955. The major powers met on five separate occasions either to negotiate on the problem or to review their progress and positions. On the part of the United States, the President appointed Mr. Harold Stassen on March 19, 1955, to act as a special assistant for disarmament. The President gave Mr. Stassen the responsibility "of developing, on behalf of the President and the State Department, the broad studies, investigations, and conclusions, which, when concurred in by the National Security Council and

approved by the President, will become basic policy toward the question of disarmament."

The President directed that—

> When indicated as desirable or appropriate under our constitutional processes, concurrences will be secured from the Congress prior to specific action or pronouncement of policy.

II. CREATION OF THE SUBCOMMITTEE

The Senate, on July 25, 1955, adopted Senate Resolution 93, 84th Congress, 1st session (extended by S. Res. 185 and S. Res. 286, 84th Cong., 2d sess.), establishing a Subcommittee on Disarmament of the Committee on Foreign Relations. Senate Resolution 93 directed the subcommittee "to make a full and complete study of proposals looking toward disarmament and the control of weapons of mass destruction." Among the questions which the subcommittee was instructed to examine were the following:

1. Efforts made by the United Nations in seeking the control and reduction of military forces and armaments of all types;
2. Disarmament proposals developed by the United States and other governments as well as by private groups and individuals;
3. Methods by which the attitudes of the American people and their Government on the subject of disarmament and world peace may be communicated abroad;
4. The relationship of armaments to the state of the world economy;
5. The relationship of underlying international tension to the problems of disarmament;
6. The dangers implicit in unilateral reduction of armaments; and
7. Methods of assuring that plans for reduction of armaments shall not endanger the security of the United States.

The subcommittee has a membership of 12, equally divided between the two parties; 6 from the Committee on Foreign Relations, 4 from the Committee on Armed Services, and 2 from the Joint Committee on Atomic Energy.

The members of the subcommittee are as follows: [1]

Hubert H. Humphrey, Minnesota, *Chairman*
Harry F. Byrd, Virginia
John J. Sparkman, Alabama
Russell B. Long, Louisiana
John O. Pastore, Rhode Island
Stuart Symington, Missouri
Styles Bridges, New Hampshire
Alexander Wiley, Wisconsin
Bourke B. Hickenlooper, Iowa
Leverett Saltonstall, Massachusetts
William F. Knowland, California
John W. Bricker, Ohio

III. WORK OF THE SUBCOMMITTEE

Staff studies

The subcommittee has released a collection of documents on disarmament and security, 1919–55, which brings together relevant docu-

[1] The late Senator Alben W. Barkley, Kentucky, was a member of the subcommittee.

mentation on the questions of armaments control as they relate to security. In addition, the subcommittee is releasing a series of staff studies on various aspects of the disarmament problem. Prepared under the direction of the subcommittee staff, with the cooperation of the Library of Congress, these studies are intended to provide factual background information. The following staff studies have been released to date:

No. 1, The Executive Branch and Disarmament Policy (February 1956).

No. 2, Disarmament: A Selected Chronology, January 1, 1918–March 19, 1956 (April 1956).

No. 3, Control and Reduction of Armaments—A Decade of Negotiations, 1946–56 (July 1956).

Other studies in the process of preparation will cover such topics as the technical problems of disarmament; disarmament problems in various geographic areas; the relationship of disarmament, security, and peaceful settlement; and the economic implications of disarmament.

Public hearings

The subcommittee has conducted nine hearings to date. All have been public. During the first phase of the hearings, witnesses were drawn from among those officials of the executive branch principally responsible for the development of policy on disarmament.

The officials who testified were:

Harold E. Stassen, Assistant to the President for Disarmament, January 25 and June 7, 1956.

John Foster Dulles, Secretary of State, February 29, 1956.

Lewis L. Strauss, Chairman, Atomic Energy Commission, and assistant to the President on atomic energy matters, March 7, 1956.

Theodore C. Streibert, Director, United States Information Agency, March 7, 1956.

Charles E. Wilson, Secretary of Defense, accompanied by Adm. Arthur W. Radford, Chairman, Joint Chiefs of Staff, March 15, 1956.

In addition, the subcommittee received the testimony of Senator Ralph E. Flanders on March 7, 1956 (accompanied by Col. Richard S. Leghorn), and Thomas E. Murray, Commissioner, Atomic Energy Commission, on April 12, 1956.

To supplement information obtained through the hearings of official witnesses, the chairman communicated a series of questions to the President's Assistant for Disarmament. These questions were related to general United States disarmament policy and to the practices of the United States information program respecting matters pertaining to disarmament. Responses to the questions on policy have been received and published as an addendum to the hearing held by the subcommittee on June 7, 1956. The questions and answers have since been employed by the United States Information Agency in its work overseas.

The subcommittee has held three hearings for private citizens and representatives of private organizations; at Cambridge, Mass., April 9, 1956; at Washington, D. C., June 8, 1956; and at Minneapolis,

Minn., June 16, 1956. Over 75 persons submitted testimony and filed statements at these hearings. At Cambridge and Minneapolis the subcommittee had the cooperation of universities in the area which arranged for panels of special witnesses to testify on technical questions related to the subcommittee's study. The verbatim records of all hearings to date have been published and released by the subcommittee.

Correspondence

The information obtained through staff studies and public hearings has been supplemented by correspondence from the public. In November 1955 the chairman wrote to private organizations and church groups, requesting copies of resolutions, statements or studies pertaining to disarmament which these groups might have released. Forty-eight organizations responded to the request, supplying the subcommittee with very useful information for its study. In addition, numerous individuals have written to the subcommittee to express their views and ideas on disarmament. A summary of these various communications appears on page 6.

IV. ANALYSIS OF UNITED STATES DISARMAMENT POLICY

The following analysis is based on the testimony of witnesses of the executive branch. At this point in its inquiry the subcommittee is seeking to establish a common understanding of the nature of disarmament policy as it is being presently pursued by the executive branch in international negotiations. It is not attempting to evaluate that policy.

Factors conditioning United States disarmament policy

At least three major factors condition disarmament policy. The research of scientists and the work of technicians and military specialists determine whether certain proposals for disarmament are feasible. Disarmament policy must reflect new methods and conclusions revealed by scientific research.

The second factor which affects disarmament policy is the point of view of our principal allies. The United States tries to make every effort to reach consensus with principal allies before negotiating with the Soviet Union. Otherwise, the latter is able to exploit differences in the viewpoint of the Western nations. A unified approach undoubtedly requires some adjustments in United States policy as it does in the case of the policies of friendly nations.

The third factor is the position taken by the Soviet Union and developments within the Communist system.

The constants in United States disarmament policy

Testimony of officers of the executive branch suggests that certain aspects of present United States disarmament policy are not subject to basic modification. These principles or constants of policy are listed below.

1. No reliable disarmament agreement can be reached unless it is completely covered by an inspection and reporting system adequate to verify reductions and guard against surprise attack; this system would include aerial surveys.

2. Present disarmament policy involves ending the arms race, reducing if not eliminating the nuclear threat, and decreasing the armaments and armed forces of the major powers. It does not involve the reduction of the weapons of war down to a level required for internal police purposes only. It does not envision that a police force and authority under the United Nations would be adequate for the security of the United States and free nations. Rather, United States policy would seek to insure security, in the event a disarmament agreement is reached, by the following means: (*a*) maintenance of a military deterrent of somewhat smaller dimensions than that which exists at the present time; (*b*) a significant reduction in military personnel and conventional armaments of all nations; (*c*) continued reliance on defense pacts already established under article 51 of the United Nations Charter.

3. The United States does not contemplate substantial reductions in its nuclear stockpile at least until techniques of detecting stockpiles of such weapons are invented or discovered. At present there is no known means by which nuclear weapons, once stockpiled, can be detected. The United States is prepared to halt, by agreement, however, further additions to stockpiles, and perhaps to begin transfers from them to peaceful uses.

4. Outstanding political questions between the Communist and free worlds must be resolved before substantial reductions can be made in armaments.

5. Any agreement reached must be carried out gradually and in stages.

Variables of United States disarmament policy

The presence of constants in United States disarmament policy does not mean that the policy is without room for flexibility. Testimony of the executive branch before the subcommittee suggests that aspects of the problem of disarmament are subject to negotiation. The principal variables appear to be the following:

1. *Manpower and weapons ceilings for conventional weapons.*—The figure of 2,500,000, for example, which the United States has proposed for the reduction of the armed forces of the major nations has been put forth for illustrative purposes only. Similarly the ceiling of 500,000 for the smaller powers (unless special circumstances require an agreed exception) has been suggested by the United States only as a possible starting point, not as a final figure.

2. *Distribution of reductions in conventional armaments.*—The United States has taken no public position on the manner in which conventional armaments should be limited. We have stated simply that once a level of military manpower had been agreed to by the principal powers, armaments should be reduced in proportion. We have not yet suggested levels for bombers, fighters, tanks, artillery, submarines, destroyers, aircraft carriers, and other types of conventional weapons.

3. *Relationship of political settlements and disarmament.*—The United States policy has consistently maintained that major political issues must be settled before substantial reductions in armaments can take place. The policy is not firm, however, regarding the amount and kind of disarmament possible prior to political settlements.

Nor has this country defined all of the political issues involved and the manner in which their solution is related to disarmament.

4. *Testing of nuclear weapons.*—At present United States policy opposes limitations on tests of nuclear weapons in the absence of general agreement on disarmament. The United States' working paper, submitted at the London meetings of March–May, 1956, however, indicated that nuclear weapons tests would be subject to limitation in a manner to be agreed upon.

5. *Relationship of reductions of nuclear weapons and conventional armaments.*—Whether conventional armaments can be reduced without parallel action to limit nuclear weapons is not clearly fixed in United States policy. At present the United States position maintains that substantial reductions in conventional armaments without curbs on nuclear weapons would give a false sense of security. Nevertheless, this country has proposed, at least for illustrative purposes, cutbacks in armaments based on manpower levels below present armed strength.

6. *Other possible areas of negotiation in United States policy.*—United States policy appears flexible with respect to the inclusion of the following matters in some way in a general agreement on disarmament: foreign military bases; the armed forces of Communist China; the extent of neutralized or demilitarized zones in Europe; and regional defense pacts.

V. VIEWS OF NONOFFICIAL WITNESSES AND CORRESPONDENTS

As noted earlier, the subcommittee has received communications from many private organizations and individuals. In addition, the testimony of about 75 private witnesses has been taken in public hearings. The subcommittee wishes to thank the groups and individual citizens who have cooperated in this fashion. They have provided the subcommittee with an extensive documentation on the problem of disarmament.

Listed below is the substance of the comments, proposals and ideas on disarmament which emerge from an analysis of this documentation. This listing is limited to views on disarmament. It does not include the many ideas which have been presented on other aspects of United States policy. The list is set forth here for purposes of information and further study. *The subcommittee emphasizes that the listing represents the views of interested groups and citizens who have taken the trouble to make their ideas available to the subcommittee. It does not necessarily reflect in any way the views of the subcommittee or any of its members.*

Disarmament, security, and peaceful settlement

All official disarmament plans are deficient in that none provides for the transformation of the United Nations into a governmental organization.

Disarmament, in reality a synonym for unpreparedness, is a well-tried formula for failure as a preventive of war.

All disarmament proposals must be mutually advantageous to both the Soviet Union and the United States.

Disarmament would involve reduction of free world cohesion.

United States security requires overwhelming air superiority.

There should be a limit to the size and number of large thermonuclear weapons in the United States stockpile, but an increase in the number of small nuclear weapons.

We are fast reaching a nuclear stalemate and, as a consequence, will be forced into a conventional arms race.

Reductions of military manpower would require much more unification of the armed services than now exists.

If a general universal disarmament agreement cannot be reached in the immediate future, we should adopt a policy of unilateral disarmament.

The United States should foster through the United Nations constitutional renunciation by all governments of the right to embark upon aggression except upon the express mandate of a majority of their citizens by popular vote.

We should spend a small percentage of our defense budget exclusively for disarmament studies. We should have a permanent disarmament institute which would be disassociated from any branch of the Armed Forces.

Disarmament requires universal membership in the United Nations; all countries should be included.

Mutual atomic terror will not suffice as a guaranty against the outbreak of limited wars.

We should try to unite nations in terms of universal interests rather than relying on a series of regional pacts.

The maximum objective of Soviet military policy is to achieve a technological superiority that would enable the U. S. S. R. to deliver a knock-out blow to the United States. The minimum objective is to achieve a parity in weapons and to use that as a basis for Soviet foreign policy. So long as the Soviet leaders have not ruled out achieving one or both objectives they are unlikely to accept effective arms control.

Disarmament and political settlements

Rearmament of Germany will increase tension and make disarmament more difficult to achieve.

In case of a European conflict American neutrality must be insured.

The United States should work for a ban on arms sales to both Israel and Arab nations in the Middle East.

Armaments are a symptom of underlying tensions, but at a certain level they become a contributing cause in those tensions. Disarmament is not a technical problem, but essentially a political one. Both the causes of war and the weapons of war must be dealt with concurrently.

Controversial political issues, such as the unification of Germany, Korea, and Vietnam and the problem of East-West trade, cannot be solved except in the context of universal enforcible disarmament.

Political settlements need not precede agreements on disarmament.

Stages of disarmament

Disarmament should be reached in stages with the time limit of each stage as short as possible.

The period of actual disarmament should be preceded by several preliminary steps, i. e., creation of inspection machinery, an arms census, and an arms truce.

A relatively long period for the implementation of the disarmament agreement would have the advantage of assuring to each nation that it would not risk too much in each phase and would provide sufficient time for the necessary shift from military to civilian production.

A comprehensive plan is a prerequisite to progress on disarmament.

Control of weapons

The mission and quality of weapons are more important to consider than actual numbers; the existence of modern weapons reduces the importance of numbers of men and increases the importance of quality, continuity of service and specialized training.

The United States should propose to the Soviet Union that nuclear and conventional armaments be reduced down to the level of rifles.

We should have an international ban on the testing of intercontinental ballistic missiles.

The testing of large thermonuclear weapons should cease.

The United States should be trying now to negotiate an agreement for stopping the development of the "surprise" weapons of the future.

All weapons of mass destruction should be eliminated and prohibited.

Nuclear bomb tests should be discontinued, principally through international agreement.

Control against future production of nuclear weapons could be limited to the nuclear materials themselves as distinguished from the facilities for production.

All Western Powers should announce that they will not use mass weapons for nonmilitary destruction unless first attacked in that way, but that we are armed and ready to use new tactical nuclear weapons against aggression.

We should negotiate as to what constitutes open cities as contrasted with legitimate targets.

The United States should obtain agreement to ban the intercontinental ballistic missile (ICBM) even if agreement is not possible to ban the intermediate-range missile (IRBM).

Inspection

Inspection and reduction of armaments should proceed simultaneously; it is undesirable that one should precede the other.

Aerial inspection is both workable and desirable, expecially when coupled with ground inspection.

Budgetary controls should be used as a basis for a reduction in armaments.

Present plans for the inspection and control of either nuclear or conventional weapons would not be effective.

Aerial inspection, although it cannot do the entire job in an inspection system, can detect the initiation of an air or ground attack.

Aerial inspection cannot distinguish the difference between a potential attack and a maneuver.

If it is to prove effective the inspection must be in operation before intercontinental ballistic missiles are included in weapons systems.

An international corps of skilled personnel is needed for aerial inspection. This could be built by a trial inspection with a friendly country like Belgium or Canada.

Aerial inspection should be made a function of the United Nations.

An International Armaments Control Agency should administer a

system of international registration, licensing, and regulation of armaments. For every million dollars of weapons, each nation would post with the international agency a bond guaranteeing the faithful performance of the nation's obligations. International courts, police inspectors would be created to implement the proposal.

To assuage Russian fears that aerial reconnaissance is only for military intelligence, the photographs might be interpreted within the borders of the Soviet Union or the taking and possession of them could be made a function of the United Nations.

The inspection service should be under the direction of a commission composed of nationals of small nations, not the big powers.

An international conference should be held to deal with the technical problems of disarmament, including the problem of detection of nuclear weapons.

Enforcement

Enforcible disarmament in any community demands agencies of government constituted to do the enforcing; disarmament should be total, universal, and controlled, enforced by law and a United Nations police force.

In a disarmament agreement, weapons should be transferred from member states to United Nations police force bases strategically located throughout the globe.

A United Nations police force could be established to help prevent local conflicts, this to be done regardless of a general disarmament agreement.

All rules and penalties would be futile unless there can be developed a will for the abolition of war as an instrument of human society.

Economy

Studies should be made to determine the effects of disarmament on the economy.

Savings from a reduction in defense spending should be used in the United States.

Resources saved through disarmament should be used for welfare purposes in less developed countries.

Individuals should set up planning commissions of their own to study how to meet the problems of unemployment of capital and labor which may result from disarmament.

Our present prosperity is not dependent on arms expenditures. To meet problems raised by disarmamemt we must further genuine democratic values in the organization of industry and the distribution of its products.

Other

The Soviet Government is prepared to continue to accept the costs of the arms race by holding down the level of welfare in the Soviet Union and the rate of growth in industries other than those connected with armaments.

In disarmament negotiations the Western nations and the Soviet Union may need a third point of view to create a synthesis of the proposals of the two sides.

The proposal for a United Nations atomic energy pool for peaceful purposes should be pursued.

The United States and the U. S. S. R. should have a large exchange of their citizens and these would be located around the major military

targets of the respective countries. Such an exchange should be carried on between other nations unfriendly to each other.

Disarmament should be made more specific and related to other aspects of American foreign policy.

Present policies on secrecy in the field of nuclear developments are excessive.

More emphasis in disarmament talks should be placed on spiritual values and less on gradualist and mechanical controls.

This country should develop a Washington project for peace similar to the Manhattan project on atomic weapons.

United States citizens are willing to relinquish some national sovereignty in return for a genuine and effective disarmament agreement.

The United States Information Agency can be of value in promoting the cause of disarmament.

Define aggression to include certain preparatory acts of a nation which if practiced would constitute a violation of an agreement. Such a procedure would allow other nations time to apply various enforcement measures.

The United States should exert more leadership in an effort to reach agreement. The appointment of a presidential assistant for disarmament is commendable but he should have more help, funds, and support within the Government.

A President's commission on disarmament should be created to resolve the confusion and conflict within the executive branch on matters that can only be decided by the people.

The work of the United Nations should be supplemented by private diplomatic talks, followed by quiet negotiations.

VI. THE ISSUES OF DISARMAMENT

At this point in its inquiry the subcommittee wishes to set forth a tentative listing of the principal issues which make up the problem of disarmament. The list is suggested by a study of the documentation accumulated from the sources previously mentioned. It is to these issues that the subcommittee will address its attention during the remaining months of the inquiry. The subcommittee expects to seek additional testimony on them and to have further staff studies directed to them. When this phase of the inquiry is completed the subcommittee should be in a position to communicate its findings, together with such recommendations as may be appropriate, to the Senate.

Disarmament, security and peaceful settlement

All nations presently seek their security to a greater or lesser degree by reliance primarily on one or more of these factors: national military power, regional or bilateral defense alliances, foreign military aid and bases, and mechanisms of the United Nations. Any significant agreement on disarmament is likely to affect the interrelationship of their dependency on these sources of security.

The issue, and it is a fundamental issue, is the manner, the extent and the conditions of international disarmament in which nations would find it to their national interests to alter the present pattern of their reliance for security on the above factors.

Disarmament and political settlements

Among the principal sources of international political tension in the world today are the following: continuing division of Germany, Korea

and Vietnam; the Arab-Israeli dispute; the ideological struggle between Communist totalitarianism and freedom; the China-Formosan question; and the question of the Middle East. The existence of these unsettled problems undoubtedly contributes to the emphasis on armaments. Armaments competition, in turn, may have some influence on the persistence of these problems.

The fundamental issue here is whether disarmament is practicable before or only following political settlements or whether it can proceed simultaneously with such settlements. If the latter is the case, there is the further question of relating the type and extent of arms controls and reduction to specific political settlements.

Stages of disarmament

General consensus appears to exist that eventually a disarmament agreement should encompass all nations, provide substantial reductions of all major types of armaments, and establish a system of inspection. Unresolved are the issues involving the timing or stages of an agreement. These issues are:

(*a*) The number of stages.
(*b*) The extent and nature of disarmament in each stage.
(*c*) The time period for the completion of each stage.
(*d*) The time lapse in between stages and the prerequisites for the movement from one stage into another.

There is also the question of whether an all-encompassing agreement should be made at the outset or whether each stage should constitute a complete and separate agreement in itself.

Control of weapons

Present consideration of the disarmament question is proceeding on the basis of two broad categories of weapons—"conventional weapons" and "weapons of mass destruction." The latter category includes nuclear and thermonuclear explosives, guided missiles with nuclear warheads and bacteriological and chemical weapons. Conventional weapons include all others.

Within each category a number of subissues arise, the principal being the following:

Conventional Weapons:

(*a*) Control of manpower or armaments or both
(*b*) Overall reduction or specified reductions for each service branch (i. e., air, naval, and land forces)
(*c*) Types of weapons to be affected by reductions

Weapons of mass destruction:

(*a*) The discontinuance of nuclear tests and possibly ballistic missiles tests prior to or as part of a disarmament agreement and what types of tests
(*b*) The discontinuance of further stockpiling of nuclear weapons and transfers out of the weapons stockpiles into peaceful uses prior to or as part of a disarmament agreement

The various subissues converge in this principal issue. Is the present distinction between conventional weapons and weapons of mass destruction in disarmament discussions valid? In other words, the question arises as to whether it is possible for disarmament to proceed in one of the two principal categories of weapons without simultaneous progress in the other. Or can a start, for example, be made

in some aspect of nuclear control independent of a beginning in conventional weapons or vice versa?

Inspection

There is general agreement that inspection has a twofold function in disarmament—as a means of preventing surprise attack with devastating weapons and as a device for verifying and maintaining the reductions of armaments established by an agreement. At the present time several types of inspection are under consideration. These include aerial survey, ground observation of military installations and movements, auditing of defense budgets, and checking of essential raw materials of potential military use.

The principal issues which arise in this connection concern the extent and nature of the employment of these various inspection techniques that is necessary to provide adequate safeguards against surprise attack and to insure the carrying out of actual disarmament agreements. These issues involve not only the degree of inspection to which the major powers are prepared to submit but also the extent to which one or more of the inspection devices need to be employed at various stages of disarmament. Finally, there is the even more fundamental issue of whether or not disarmament in any form prior to agreement on inspection is in fact safe disarmament.

Enforcement

Inspection may determine if a disarmament agreement is being violated by one or more of the parties to it. The question still remains as to what, if any, effective recourse can be provided for those nations which abide by the agreement as against those which do not? This issue has several principal facets. It involves enforcement action against smaller powers in violation of an agreement as distinct from violations by the principal nations. It involves the gradation of recourse to fit the seriousness of the violation. It involves the nature of recourse for violations affecting control and reduction of armaments as distinct from those involving preparations for sudden surprise attack. It involves, in the last analysis, whether any enforcement measures, and if so, what measures short of war could be invoked against violations of an agreement by a major power.

Methods and scope of international negotiations

For the past 2½ years most of the disarmament negotiations have been conducted through a five-nation subcommittee of the United Nations Disarmament Commission, composed of the United States, the United Kingdom, the U. S. S. R., France, and Canada. The subcommittee meetings are held in secret although condensations of the discussions are provided frequently to the public. At the conclusion of each round of negotiations, the verbatim records are released. The agenda of the subcommittee is confined to disarmament; political questions are excluded.

The principal issues which arise in this connection are whether the present limited participation in negotiations, "semisecret" procedures, and the exclusion of political issues from the agenda provide the most effective circumstances for achieving agreement on disarmament.

Economic implications of disarmament

Present defense expenditures of all countries of the world run in excess of $100 billion a year. Armaments enter into world trade. The production of armaments has an effect on the domestic economies of all nations. The principal questions which arise in this connection involve the probable impact of reductions in military establishments and armaments production on the economies of the major nations, especially the United States and the Soviet Union, and the alternative usages to which any shift in the productive capacity represented by armaments and defense establishments might be put.

Organization of the executive branch for disarmament

All of the relevant agencies of the executive branch participate in formulation of disarmament policy. Coordination of policy, under the National Security Council, was formerly a primary responsibility of the Department of State. This responsibility is now lodged in a special assistant to the President, who also represents the United States in international negotiations on disarmament. The issue which arises is whether or not the present organizational structure of the executive branch is the most effective possible for bringing to bear relevant information on disarmament policy, for formulating that policy and for executing it.

CONTROL AND REDUCTION OF ARMAMENTS

INTERIM REPORT

JANUARY 17, 1956

31345 O—58——7

FOREWORD

The Committee on Foreign Relations transmits herewith to the Senate an interim report of the Subcommittee on Disarmament, created pursuant to the terms of Senate Resolution 93, 84th Congress, 1st session. The Committee on Foreign Relations agreed to recommend to the Senate that the subcommittee be continued until July 1, 1956, in order to complete its studies and that the chairman of the subcommittee be requested to introduce a resolution giving effect to that recommendation.

This report is submitted to the Senate by Senator Hubert H. Humphrey, chairman of the subcommittee, during the period covered.

84TH CONGRESS } SENATE { REPORT
2d Session } { No. 1397

CONTROL AND REDUCTION OF ARMAMENTS

JANUARY 17 (legislative day, JANUARY 16), 1956.—Ordered to be printed

Mr. HUMPHREY, from the Committee on Foreign Relations, submitted the following

INTERIM REPORT

[Pursuant to S. Res. 93, 84th Cong.]

1. INTRODUCTION

Since the end of World War II, the United States has sought in the United Nations and by other international means to lessen the dangers to peace by developing controls over the instrumentalities of war. These efforts have so far proved unavailing but they have not been abandoned.

Indicative of the deep and continuing interest of this country in the question was the appointment by the President on March 19, 1955, of a Special Assistant on Disarmament to aid the executive branch in formulating disarmament policy. In appointing the Special Assistant, the President directed that—

> when desirable or appropriate under our constitutional processes concurrences will be secured from the Congress prior to specific action or pronouncement of policy.

The problems of the control and reduction of armaments are among the most complex with which the United States is confronted. They relate directly to foreign policy and to the national security. They must be considered, moreover, in a world in which scientific progress in nuclear energy has multiplied the potential destructiveness of war a thousandfold in the space of hardly a decade. In a matter of such scope and of such vital importance to the people of the Nation, the Congress not only has a common responsibility with the executive branch but an independent responsibility as well to ascertain that the policies of the United States serve the national interest.

2. Creation of the Subcommittee

By Senate Resolution 93 (84th Cong.) a special subcommittee of the Committee on Foreign Relations was established. It was directed by the Senate to make a full and complete study of the question of disarmament to assist the Senate in discharging its responsibilities. The terms of the resolution provided for 12 members, equally divided between the two parties. Six members were appointed from the Committee on Foreign Relations by its chairman. The President of the Senate appointed 4 members from the Committee on Armed Services and 2 from the Joint Committee on Atomic Energy.

The subcommittee consists of the following members:

COMMITTEE ON FOREIGN RELATIONS

Senator Hubert H. Humphrey (chairman of the subcommittee)
Senator John J. Sparkman
Senator Alben W. Barkley
Senator Alexander Wiley
Senator Bourke B. Hickenlooper
Senator William F. Knowland

ARMED SERVICES COMMITTEE

Senator Harry F. Byrd
Senator Stuart Symington
Senator Styles Bridges
Senator Leverett Saltonstall

JOINT COMMITTEE ON ATOMIC ENERGY

Senator John O. Pastore
Senator John W. Bricker

Because of the complexity and great importance of the issues of disarmament, the subcommittee has approached its study with great caution. During the past 6 months, it has laid an extensive groundwork for its inquiry.

If its authority is extended, the subcommittee contemplates the issuance in the near future of a series of background studies on various aspects of the question of the control and reduction of arms. It also plans to hold hearings to obtain the views of officials of the executive branch and the comments and ideas of private citizens.

3. Recommendations

It is recommended that the Senate provide the subcommittee with authority to continue the inquiry until July 1, 1956. During that time, the subcommittee expects to complete the work outlined above and report to the Senate the results together with such recommendations as it deems appropriate. The subcommittee is returning approximately $14,000 of the $25,000 made available from the contingent fund of the Senate for the initial phase of its study. It is requesting $35,000 for the period February 1, to July 1, 1956, in order to carry on the inquiry described in Senate Resolution 93. A budget for the subcommittee is appended.

COMMITTEE ON FOREIGN RELATIONS

SUBCOMMITTEE ON DISARMAMENT

(Created pursuant to S. Res. 93, 84th Cong., 1st sess.)

Budget, Feb. 1–July 1, 1956

Position	Number	Base salary (per annum)	Gross salary (per annum)	Monthly salary (gross)	Total for period of budget (gross)
Staff:					
Legal and investigative:					
Staff director	[1] 1	$7,980	$13,587	$1,132.25	$5,661.25
Special counsel (consultant)	1	6,300	11,091	924.25	4,621.25
Editorial and research: Research assistants	[1] 2	4,080	7,584	632.00	6,320.00
Administrative and clerical: Assistant clerks (secretaries)	[1] 2	2,040	4,090	340.83	3,408.30
Subtotal, staff expense					20,010.80
Administrative:					
Reimbursable payments to agencies (additional to above salaries as indicated)					5,000.00
Travel (inclusive of field investigations)					5,500.00
Hearings (inclusive of reporters' fees)					2,000.00
Witness fees, expenses					500.00
Stationery, office supplies					300.00
Communications, telephone and telegraph					200.00
Newspapers, magazines, documents					200.00
Contingent fund					1,289.20
Subtotal, administrative expense					14,989.20
Total					35,000.00

[1] The staff director, 1 research assistant, and 1 assistant clerk are on reimbursable detail from the Library of Congress.

ANNEX II. STAFF STUDIES

THE EXECUTIVE BRANCH AND DISARMAMENT POLICY

STAFF STUDY NO. 1

FEBRUARY 1956

PREFACE

By Senator Hubert H. Humphrey, Chairman

This study outlines the procedures of the executive branch in making and carrying out policy on the control and reduction of armaments. In so doing it illustrates a problem of great concern to the American people—the growing complexity of the executive branch of our Government. Certainly it is in the interests of the United States to see to it that all executive agencies which have anything to contribute are brought into play in major questions of national policy. On the other hand, channels of coordination and responsibility among these agencies must be clear-cut and efficient. Otherwise the multiplicity of agencies which become involved in policy will only make complex questions more complex and hamper effective action by the Government.

I asked the staff to prepare this study of the executive branch and disarmament policy for the use of the subcommittee because the Senate and the people of the United States have a deep interest in understanding how their Government functions in this important matter. Government machinery must have certain characteristics if it is to produce effective policies on the control and reduction of armaments. It must, for example, bring to bear promptly and efficiently resources and knowledge for dealing with disarmament matters. It must provide clear-cut authority and responsibility. It must, in short, facilitate safe, intelligent, and informed decisions.

On March 19, 1955, the President appointed a special assistant on disarmament, with Cabinet rank. He assigned to his assistant wide duties in the field of disarmament. His action suggested that the problem of control and reduction of armaments was of such dimensions that the regular machinery of the executive branch was inadequate to cope with it.

The President's attempt to bring a fresh approach to the question is understandable. Prior to his action disarmament matters were largely the concern of the regular departments and agencies of the Government. For years, they made little progress in this field and meanwhile the destructive power of weapons increased at a fantastic rate.

It still remains to be seen, however, whether the recent change in organization will produce effective results. So far the most tangible achievement of the office of the special assistant on disarmament appears to be the aerial inspection proposal. This proposal provides for mutual inspection of military facilities between the Soviet Union and the United States. It is not a new proposal but rather a modernization of an older idea, first advanced by the United States in 1946 and again in 1952. It has run into about the same intransigeance from the Soviet Union as its predecessors.

Significant results may yet emerge from the appointment of the special assistant on disarmament. In the meantime, however, it should be noted that one effect of the appointment has been to add

another agency, presumably temporary, to a field in which many permanent departments and agencies are already active. This increases Government expenditures. It also appears to add to the complexity of the machinery for Government making and carrying out policy on control and reduction of armaments. That is the case, especially since the responsibility and authority of the President's assistant and his staff have yet to be made entirely clear in practice

This study of the executive branch and disarmament (staff study No. 1) was prepared under the direction of the subcommittee staff by Carlile Bolton-Smith, American Law Division, Legislative Reference Service, Library of Congress. It is a factual account of executive procedures related to disarmament intended for the background use of the subcommittee. It does not necessarily reflect the views of the subcommittee or any of its members.

FEBRUARY 20, 1956.

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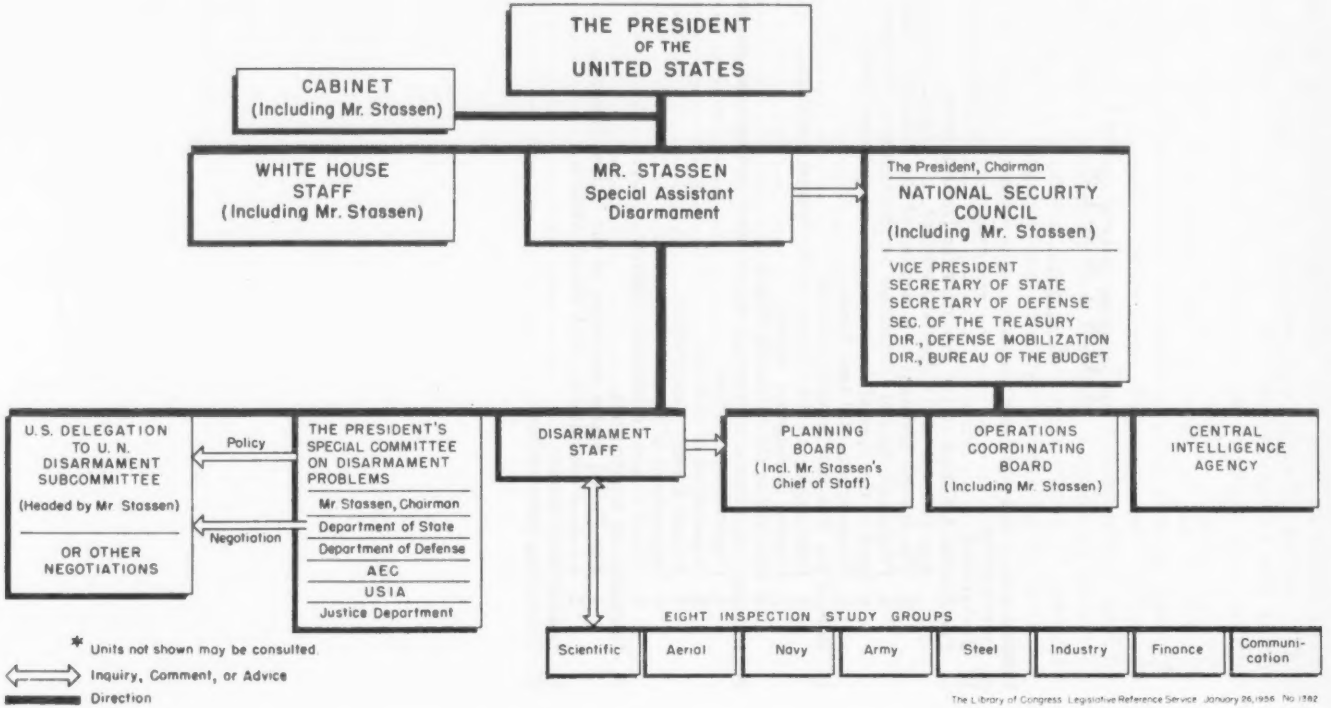
DISARMAMENT: Detailed Relationships For Its Formulation And Consideration by the Executive Branch*



The Library of Congress Legislative Reference Service January 26,1956 No 1382

THE EXECUTIVE BRANCH AND DISARMAMENT POLICY

A. INTRODUCTION

The United States Government has for many years been concerned with disarmament in the sense of questions relating to the control and reduction of armaments. It has, in the past, entered into treaties for that purpose.

The earliest recorded American disarmament treaty was that signed at Washington, April 28, 1817, limiting "the naval force to be maintained upon the" Great Lakes by the United States and Canada. The Treaty of Versailles, negotiated by President Woodrow Wilson in 1919, but which never came into effect with respect to the United States, limited German armament. The Washington Naval Treaty of 1922 limited the navies of the United States of America, the British Empire, and Japan to a 5–5–3 ratio. The London Naval Treaty of 1930 altered and supplemented these limitations. World War II surrender terms imposed disarmament upon Germany and Japan, restrictions which were later relaxed.

Before World War II, the procedures and the administrative structure within the executive branch for arriving at an official position on questions of disarmament were relatively simple. Disarmament was generally regarded as preponderantly an aspect of foreign policy and the Secretary of State with the advice of the Secretaries of the military departments (War and Navy) assumed responsibility for such matters under the President.

The present organizational procedures within the executive branch are in marked contrast to this earlier simplicity. Armaments and the problem of their control have grown more complex since the beginning of World War II. So too have the administrative structure and the executive procedures for formulating policies for dealing with them.

Among the Government agencies which are now concerned in a more or less continuing fashion with these problems are the Department of State, the Department of Defense (including the military departments of the Army, Navy, and Air Force, and also the Joint Chiefs of Staff), the Atomic Energy Commission, the United States Information Agency, the Central Intelligence Agency, the National Security Council, and the Office of the Special Assistant to the President for Disarmament.

The latter organization, created in the spring of 1955, is the most recent addition to the list of agencies concerned with disarmament and the Special Assistant has been given Cabinet rank by the President. In some respects, it appears to be the chief coordinating agency and clearinghouse for the regular agencies of the executive branch in formulating United States policy respecting disarmament.

With many agencies involved, the machinery for handling disarmament questions in the executive branch is very complex. It

is difficult to follow the lines of procedure and to determine precisely where responsibility and authority lie. That is true even if study is limited—as the present study is—to the executive machinery directly concerned with policy on the control and reduction of military armaments. Yet, there are many other parts of the executive machinery which have some relationship to disarmament policies, such as those concerned with foreign aid, foreign loans, commerce, travel, immigration, and internal security.

B. BACKGROUND

International discussion related to disarmament and the control of atomic energy has been going on almost continuously, largely in the United Nations, since the end of World War II. In the initial postwar years the United States' position in these matters was formulated and cleared largely through the executive machinery which was handling other foreign policy problems.

The Office of United Nations Affairs in the Department of State cleared such matters with other interested offices (including the Policy Planning Staff when it was formed) within the Department, with the military departments and, after 1947, with the Department of Defense. In the latter Department, a Special Assistant to the Secretary for Foreign Military Affairs obtained concurrence or comment from interested branches in the Office of the Secretary of Defense, and in the three military departments.

With the creation of the National Security Council in 1947, a focal point was established for coordinating disarmament matters, as well as other foreign and military policy, for presentation to the President.[1]

Prior to the appointment of the Special Assistant to the President for Disarmament, disarmament questions were presented to the National Security Council through an interdepartmental staff drawn from interested agencies and departments and culminating in the Executive Committee for the Reduction of Armaments (RAC). In practice, this Executive Committee included representatives of the Department of State, the Department of Defense, and the Atomic Energy Commission, with the representative of the Department of State acting as chairman. The interdepartmental staff of the Executive Committee was drawn from the "working level" of the three agencies composing the Committee. In theory, the staff members did not represent their agencies but worked as individuals and reflected their own views based on their working experience.

The staff sought to formulate policy papers on which the departmental members of the Executive Committee could agree. In the absence of agreement, or if the proposal went beyond the established policy of the National Security Council, the Committee could forward the position paper indicating the difference of opinion to the senior staff of the National Security Council and, if deemed sufficiently important by that body, the problem would go to the Council itself.

[1] See sec. D for organization and membership of the National Security Council.

The initiative in the operation of the interdepartmental staff of the Executive Committee for the Reduction of Armaments came from the Department of State. After the appointment of Mr. Harold E. Stassen as Special Assistant to the President, the initiative for developing disarmament proposals passed to his office. As not infrequently happens, however, when new governmental machinery is established to handle an old problem, the Executive Committee for the Reduction of Armaments and its interdepartmental staff were not abolished. They merely ceased to function for the time being; however, the knowledge of the personnel has remained available to their respective departments.

Nor was any formal change made in the practice whereby the Department of State serves as the channel for transmitting the views of the Government to United States delegations considering disarmament questions with representatives of foreign powers, and supports the activities of such delegations. However, the Special Assistant often conducts such discussions.

C. THE SPECIAL ASSISTANT TO THE PRESIDENT FOR DISARMAMENT

1. Appointment of the Special Assistant

On March 19, 1955, a White House press release was issued calling attention to the fact that—

> The recent session of the Disarmament Commission of the United Nations has again resulted in no progress and no clear crystallization of thinking on this subject.

The President announced that, as a result, he had—

> established a position as Special Assistant to the President with responsibility for developing, on behalf of the President and the State Department, the broad studies, investigations, and conclusions which, when concurred in by the National Security Council and approved by the President, will become basic policy toward the question of disarmament.
>
> When indicated as desirable or appropriate under our constitutional processes, concurrences will be secured from the Congress prior to specific action or pronouncement of policy.

The Presidential statement specified that the position would be of Cabinet rank and announced that the President had appointed "Harold Stassen as a Special Assistant for discharge of this responsibility." [2] It stipulated that the Special Assistant—

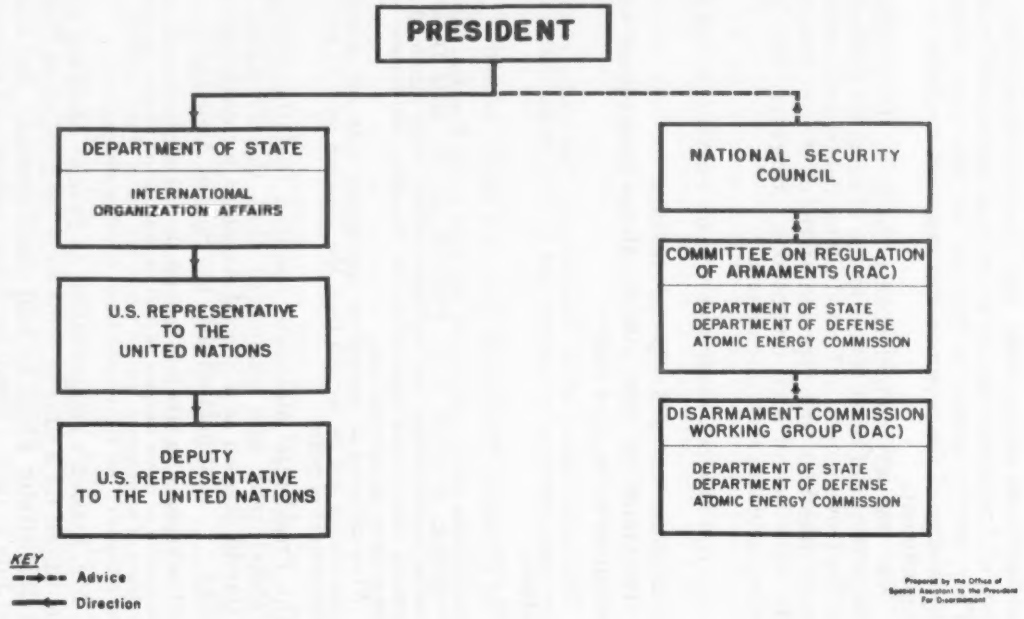
> will be expected to take into account the full implications of new weapons in the possession of other nations as well as the United States, to consider future probabilities of armaments, and to weigh the views of the military, the civilians, and the officials of our Government and of other governments.

Mr. Stassen's compensation as Special Assistant for Disarmament continued for a time to come from his position as Foreign Operations Administrator which he held simultaneously, but that source ceased on July 1, 1955. Funds for future salaries and expenses of the Special Assistant and his office were included in the President's supplemental

[2] His commission is dated March 19, 1955.

EXECUTIVE BRANCH ORGANIZATION FOR DISARMAMENT

PRIOR TO ESTABLISHING THE OFFICE OF THE SPECIAL ASSISTANT TO THE PRESIDENT FOR DISARMAMENT



budgetary request for appropriations to the White House for the fiscal year 1956 [3] which the President may expend in his discretion.[4]

In the spring of 1955, the President specified the responsibilities of the Special Assistant and his working relationships with other parts of the executive branch. In August of 1955 the latter was informed that he would be Deputy United States Representative on the United Nations Disarmament Commission [5] to sit for the United States in the Subcommittee of said Commission. In that capacity Mr. Stassen was to serve under the direction of Ambassador Henry Cabot Lodge, Jr., the United States Representative to the United Nations. If the Special Assistant dealt with other nations outside of the framework of the United Nations, he would work under Mr. Dulles. In other aspects of his duties, he would report to the President.

2. The Special Assistant as a Member of the President's Staff

Mr. Stassen's appointment as Special Assistant to the President for Disarmament, with Cabinet rank, placed him within the White House staff and also entitled him to attend Cabinet meetings. Such principal members of the White House staff have direct access to the President under ordinary conditions.[6]

Although, as an assistant to the President, Mr. Stassen has the privilege of taking proposals directly to the President, the language of the press release announcing his appointment states that in order to become policy, disarmament proposals would need to be "concurred in by the National Security Council."

The President, in turn, as Commander in Chief and as President of the United States, has constitutional power in military affairs and in foreign relations and can, therefore, decide on disarmament policy to the extent that such decision resides within the exclusive authority of the executive branch. Accordingly, he can issue directives to the agencies of that branch. He can, of course, also make proposals to the Congress when concurrence in a particular course is required under the Constitution.

Since disarmament directly concerns both the Department of State and the Department of Defense (as well as other departments), however, the Special Assistant is under the necessity of coordinating

[3] S. Doc. 48, 84th Cong., 1st sess. Testimony of Director of the Budget, pp. 2-4 of Hearings on General Government Matters Appropriations, 1956, before a Senate Appropriations Subcommittee on H. R. 6499.

[4] Public Law 110, 84th Cong., 1st sess. General authority for the President's action in appointing the Special Assistant to the President may be derived from the U. S. Code, title 3, secs. 105 and 106, and title 5, Sec. 55a, and from Public Law 428, 83d Cong., although, of course, these laws do not mention the specific position. No statutory authority was necessary to give him Cabinet rank. Mr. Stassen's commission does not cite any statute, but reads as follows:

DWIGHT D. EISENHOWER

PRESIDENT OF THE UNITED STATES OF AMERICA

To Harold E. Stassen of Pennsylvania: Greeting

Reposing special trust and confidence in your integrity, prudence, and ability I do appoint you Special Assistant to the President of the United States of America, authorizing you, hereby, to do and perform all such matters and things as to the said place or office do appertain, or as may be duly given you in charge hereafter, and the said office to hold and exercise during the pleasure of the President of the United States for the time being.

In testimony whereof, I have caused the seal of the United States to be hereunto affixed.

Done at the city of Washington this nineteenth day of March in the year of our Lord one thousand nine hundred and fifty-five, and of the independence of the United States of America the one hundred and seventy ninth.

(Signed) DWIGHT D. EISENHOWER

By the President:
(Signed) JOHN FOSTER DULLES,
Secretary of State.

[5] A post to which he was appointed August 2, 1955, after Senate confirmation August 1, 1955, 101 C. R. 10949. He was sworn in August 5, 1955.

[6] There are about 40 staff members assisting the President within the White House. About 16 of these have direct access to the President, and several of these (including the Special Counsel to the President) would presumably be concerned with disarmament problems in the event they involved legislation or policy pronouncements by the President.

with interested Cabinet members. This he may do by direct consultation with these officials and by discussion during Cabinet meetings. It is also customary practice to obtain advance coordination among the departments either through the committee structure under the National Security Council or by other committees.

3. President's Special Committee on Disarmament Problems

The President also directed the Special Assistant to form a Special Committee on Disarmament Problems. The Special Committee is designed as the principal channel of interdepartmental coordination in matters of disarmament. It is composed of senior representatives (Assistant Secretaries or the equivalent) of the following departments and agencies:

Department of State
Department of Defense and Joint Chiefs of Staff
Atomic Energy Commission
Department of Justice
Central Intelligence Agency
United States Information Agency

The stated purpose of the President's Special Committee on Disarmament Problems is "to provide maximum effectiveness in carrying forward a concentrated endeavor to reach a sound disarmament agreement under effective safeguards." It is said to have "served as an effective device to keep the represented agencies informed of all aspects of United States activities in the field of disarmament" and to have "also * * * served as a medium of exchange of views and statements of departmental positions on various aspects of United States disarmament policy planning." [7] It has met 13 times since its establishment.[8]

4. Staff of the Special Assistant; the Disarmament Staff

Matters pertaining to disarmament which are presented to the President's Special Committee for consideration are usually prepared by members of the Special Assistant's immediate staff called the Disarmament Staff.[9] This Staff is composed of officials designated and lent

[7] Letter dated November 4, 1955, from the Disarmament Staff to the subcommittee. The 13th meeting was January 6, 1956. Its first meeting was August 22, 1955.

[8] Members of the President's Special Committee on Disarmament Problems as of January 20, 1956 were—
State.—Member—Mr. David W. Wainhouse, Deputy Assistant Secretary of State for International Organization Affairs; alternate—Mr. Robert R. Bowie, Assistant Secretary of State, Director of the Policy Planning Staff, and State Department Representative on the National Security Council Planning Board.
Defense.—Member—Gen. Herbert B. Loper; alternate—Col. Thomas W. Abbott (succeeding Col. William B. Bailey).
United States Information Agency.—Member—Mr. Andrew H. Berding, Assistant Director of USIA for Policy and Programs; alternate—Mr. Orenn Stevens.
Justice.—Member—Mr. J. Lee Rankin, Assistant Attorney General, Office of Legal Counsel; alternate—Mr. Frederick W. Ford.
Central Intelligence Agency.—Member—Mr. Richard Bissell; alternate—Mr. James Q. Reber.
Atomic Energy Commission.—Member—Dr. John von Neumann, Member of Commission; alternate—Dr. Paul Fine.

[9] The members of Mr. Stassen's immediate staff (together with the names of the agencies from which they are assigned) are—
Mr. Robert E. Matteson, Director
Mr. Edmund A. Gullion (State)
Col. R. B. Firehock (Army)
Capt. D. W. Gladney (Navy)
Mr. McKay Donkin (AEC)
Col. Ben G. Willis (Air Force)
Mr. Lawrence D. Weiler (State)
Mr. John Lippmann (ICA)
and a CIA staff man
Recently designated as Deputy Special Assistant to the President for Disarmament is Mr. Amos J. Peaslee, former American Ambassador to Australia.
Among the consultants to the Disarmament Staff is Mr. Edgar Turlington, a former Assistant Legal Adviser of the Department of State, former chairman of the section of international and comparative law of the American Bar Association.

by interested agencies. Its Chief of Staff is Mr. Robert E. Matteson. Members of the staff assist Mr. Stassen on the basis of their experience in their own agencies but they do not represent or bind their parent agencies. They are not representatives of the executive agencies as are the members of the President's Special Committee. As a matter of practice, however, the members of the Special Assistant's staff keep in touch with the action officers handling disarmament questions in their own departments and agencies.

The Special Assistant and the Director of the Disarmament Staff are compensated out of funds appropriated for special projects in the Executive Office of the President.[10] The other Disarmament Staff members are compensated by their parent agencies. Of the $1,250,000 so appropriated, $490,000 was requested by the Bureau of the Budget as Mr. Stassen's appropriation to carry out his duties.[11]

5. Nongovernmental task forces

On October 7, 1955, Mr. Stassen said that United States disarmament policy, particularly as it pertains to inspection, was being basically reviewed. He announced that eight task force study groups were to provide the technical basis for the review by "a new, fundamental and extensive expert study * * * of the methods of international inspection and control." [12]

The names of the Chairmen and the scope of the study being undertaken by each group were reported in the press as—

(1) Dr. Ernest O. Lawrence, director of the University of California radiation laboratories at Livermore, Calif., to head a large panel of nuclear physicists to study methods of nuclear inspection.

(2) Retired Gen. James H. Doolittle, vice president of the Shell Oil Co., to head a group designing methods for aerial inspection as proposed by President Eisenhower.

(3) Retired Vice Adm. Oswald S. Colclough, dean of faculties at George Washington University, to lead a task force on navies and navy aircraft and missiles.

(4) Retired Lt. Gen. Walter Bedell Smith, President Eisenhower's chief aide in World War II and later Ambassador to Moscow, to design inspection and reporting methods for army and ground force units.

(5) Benjamin Fairless, of the United States Steel Corp., to head a task force on steel, "the core of military industry."

(6) Walker L. Cisler, president of the Detroit Edison Co., to direct development of inspection and reporting methods on power facilities and on industry in general.

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[10] The appropriation reads as follows:

"SPECIAL PROJECTS

"For expenses necessary to provide staff assistance for the President in connection with special projects, to be expended in his discretion and without regard to such provisions of law regarding the expenditure of Government funds or the compensation and employment of persons in the Government service as he may specify, $1,250,000: *Provided*, That not to exceed 10 percent of this appropriation may be used to reimburse the appropriation for 'Salaries and expenses,' the White House Office, for administrative services." (Public Law 110, 84th Cong., 1st sess. See also S. Rept. 573 and S. Doc. 48 of the same session.) The 10-percent limitation is applied to the White House's "administrative services," such as personnel management, which must be augmented to service the staffs conducting the special projects.

[11] Hearings, General Government Matters Appropriations, 1956, before a subcommittee of the Senate Appropriations Committee on H. R. 6499, June 14, 1955, pp. 3–4.

[12] U. N. Disarmament Commission DC/SC.1/PV.68, October 7, 1955, pp. 72–73.

(7) Dr. Harold Moulton, of the Brookings Institution, to lead a study of inspection and reporting on national budgets and finances, particularly in regard to a French proposal that any moneys saved through arms reductions should be contributed to the aid of underdeveloped countries.

(8) Dr. James B. Fisk of the Bell Telephone Laboratories to head a group designing "a method of rapid, continuous, reliable communications, without interference, necessary to implement an international inspection and reporting system." [13]

The task forces report to Mr. Stassen. They are expected to disband on completion of their reports.

D. ROLE OF THE NATIONAL SECURITY COUNCIL

1. Relationship to the Council of the Special Assistant

The National Security Council was established by section 101 of the National Security Act of 1947 (61 Stat. 497, as amended, U. S. C. 50: 402). Its purpose was to advise the President as to coordinated policy relating to national security which would include, of course, disarmament matters.

The Secretaries of State and Defense and the Director of the Office of Defense Mobilization are statutory members of the National Security Council and the President is Chairman. Other Cabinet members and officials may be invited to attend when the Council considers matters within the jurisdiction of their departments or agencies.[14]

Prior to his appointment as Special Assistant, Mr. Stassen was Director of the Foreign Operations Administration. In that position, he was a regular attendant at the meetings of the National Security Council.

As Special Assistant to the President, Mr. Stassen continues to attend meetings of the National Security Council. The Special Assistant may make disarmament proposals directly to the National Security Council which would be reviewed through its staff and committee system and its Planning Board, on which Mr. Matteson represents Mr. Stassen and others represent their agencies. Any of Mr. Stassen's "broad studies, investigations, and conclusions" must be concurred in by the National Security Council before they "become basic policy toward the question of disarmament." [15]

2. Central Intelligence Agency

The National Security Act of 1947, which established the National Security Council, also authorized the creation of the Central Intelligence Agency and made it subject to the National Security Council. The CIA is a large staff structure for furnishing information and analysis and has representatives on the committees and staff of the National Security Council. Presumably the CIA would be in a position to supply pertinent information in connection with the consideration of the disarmament proposals in the National Security Council as well as by the President's Special Committee on Disarmament Problems on which it is represented by a Deputy Director.

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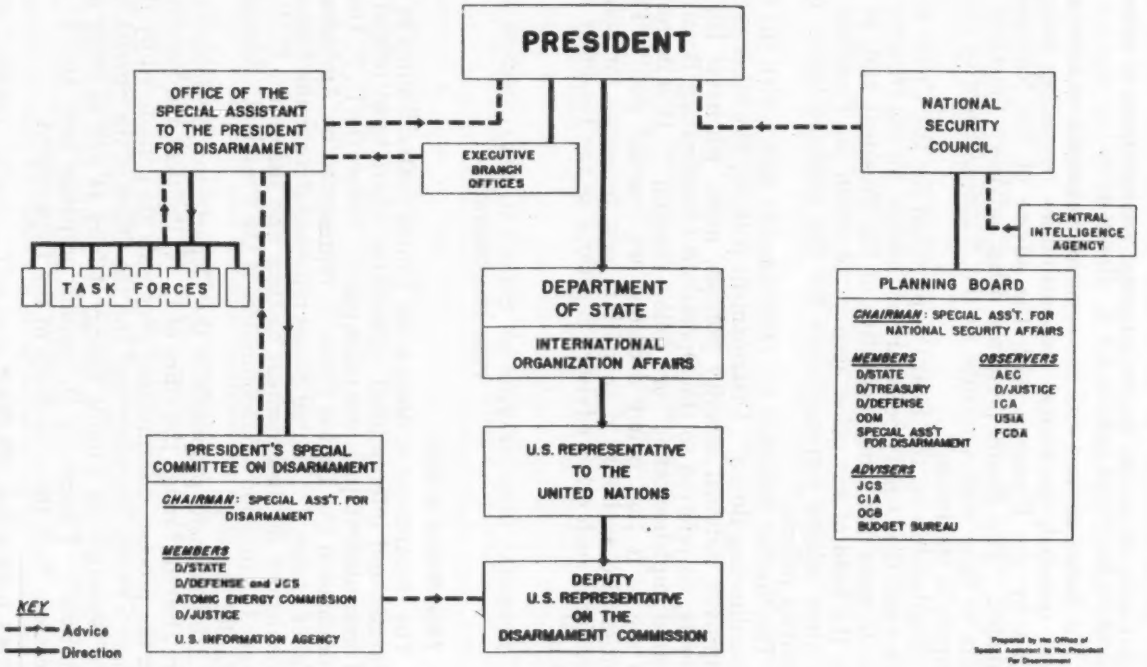
[13] Source: Washington Star, Saturday, October 8, 1955, pp. 1, 2 (byline: James E. Roper, Star staff correspondent, United Nations, 1955). See also verbatim transcript of session, supra, pp. 72–74.

[14] In the absence of the President, the Vice President has presided.

[15] White House press release of March 19, 1955.

EXECUTIVE BRANCH ORGANIZATION FOR DISARMAMENT



3. Operations Coordinating Board

Under the National Security Council, the Operations Coordinating Board was established by Executive Order No. 10483, September 3 1953[16]—

> [In] order to provide for the integrated *implementation* of national security policies by the several agencies * * *. [Italics added.]

The Board advises with the agencies concerned on how to carry out their detailed operational responsibilities respecting policy decided upon by the President with the advice of the National Security Council. The Board performs other advisory functions and from time to time makes reports to the National Security Council with respect to its duties.

Membership on the Board is provided for the Under Secretary of State and the Deputy Secretary of Defense, for the Director of Central Intelligence, for a representative of the President and, as necessary, for the head of any other agency "to which the President from time to time assigns responsibilities for the implementation of national security policies."

The Special Assistant for Disarmament meets with the Operations Coordinating Board. Disarmament policies, like other presidentially approved national security policies, must, whenever the President directs, be referred to the Operations Coordinating Board for "integrated implementation" or "follow through." It is its responsibility to see to it that policy decisions are "carried out." The Board's duties also authorize it to initiate new proposals for action and to "perform such other advisory functions as the President may assign to it."

E. INTERNAL ORGANIZATION OF PRINCIPAL DEPARTMENTS AND AGENCIES CONCERNED

1. Department of State

The Department of State is the United States channel to the United Nations and international conferences where most official discussion of disarmament questions takes place. Before the U. N. Disarmament Commission the United States is represented by Ambassador Henry Cabot Lodge, Jr., United States representative to the United Nations. His deputy for disarmament matters who sits on the U. N. Disarmament Commission's Subcommittee is the President's Special Assistant Harold Stassen.

Disarmament proposals to the Department, irrespective of source, are cleared through the office of U. N. Political and Security Affairs.[17] In the process, disarmament proposals are considered by the Department's Policy Planning Staff and the Office of the Special Assistant to the Secretary on Atomic Energy Affairs as well as other appropriate bureaus.[18] Clearances on specific proposals may also be sought on occasion from the area desks of the Department.

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[16] 18 F. R. 5379: U. S. C. A. 50: 402 note.

[17] The Director of this office is Mr. Niles Bond who reports to Mr. Francis O. Wilcox, Assistant Secretary of State for International Organization Affairs. Mr. Howard Meyers, working under Mr. Bond, handles these clearances.

[18] Mr. Robert Bowie is Assistant Secretary for Policy Planning, Director of the Policy Planning Staff, and Department representative on the National Security Council Planning Board. Mr. Gerard C. Smith is the Special Assistant to the Secretary for Atomic Energy Matters.

In connection with these multiple clearances, there is a distinction to be borne in mind. It is the difference between policy formulation and actual operations in the international field. Although Mr. Stassen's organization may devise policy and the Operations Coordinations Board may perfect techniques of implementation, the specific moves to develop a situation toward the desired end are processed through the Department of State channels to the United Nations, or to international conferences.

2. Department of Defense

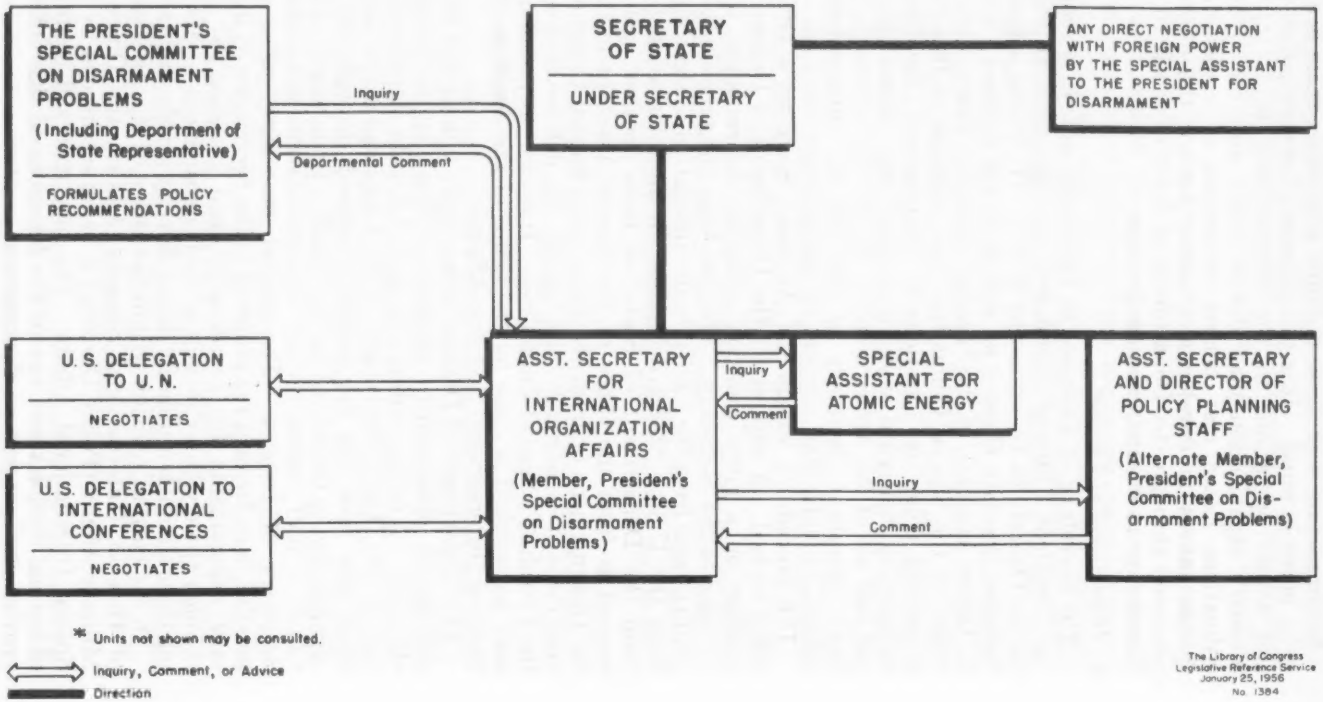
The Secretary of Defense, as previously noted, is represented on the President's Special Committee on Disarmament Problems and on the Operations Coordinating Board. He is also a member of the National Security Council as well as of the Cabinet. Gen. Herbert B. Loper, assistant to the Secretary (Atomic Energy) represents the latter on the Special Committee. In addition to this deep interest in general policy on questions of disarmament, the Department is unilaterally concerned since the subject may ultimately involve the size and use of the Armed Forces. Under the Secretary, Mr. Gordon Gray, Assistant Secretary of Defense for International Security Affairs, provides staff support on disarmament matters.

The procedures within the Assistant Secretary's Office are now being revised. A request for the Department of Defense to state its position on a given question involving disarmament will continue to come to the Secretary. This has been the procedure whether the inquiry came from the United States delegation to the United Nations, from the United States delegation to an international conference, from the Department of State, or from another agency. If the request is from the Office of the Special Assistant to the President for Disarmament or from the President's Special Committee on Disarmament it is normally directed to the defense representative on the President's Special Committee. However, any staff action which may be required is done by the Office of the Assistant Secretary of Defense (International Security Affairs).

The Department of Defense occasionally follows two clearance procedures on disarmament questions. The first is through military channels. A memorandum is prepared (for the signature of the Secretary or the Deputy Secretary) to the Chairman of the Joint Chiefs of Staff who then has the matter processed through the Joint Staff organization to the Joint Chiefs of Staff. Upon approval by the Joint Chiefs of Staff, comments and recommendations are submitted to the Secretary of Defense. The second procedure, when opportunity permits, is to forward the proposal to the Secretaries of the three military departments for coordination and handling by their offices through the civilian channels of their departments. Matters following these channels ordinarily do not directly involve military questions.

In the current revision within the Office of the Assistant Secretary of Defense (International Security Affairs) the Office of Foreign Military Affairs (Policy Division) is being superseded by the Office of Special International Affairs. The new unit will contain an Office of Special Projects and one of the functions of this Office will be to provide staff support on disarmament matters.

DISARMAMENT: PROCEDURES FOR ITS CONSIDERATION BY THE DEPARTMENT OF STATE*


THE PRESIDENT'S SPECIAL COMMITTEE ON DISARMAMENT PROBLEMS
(Including Department of State Representative)
FORMULATES POLICY RECOMMENDATIONS
Inquiry
Departmental Comment
SECRETARY OF STATE
UNDER SECRETARY OF STATE
ANY DIRECT NEGOTIATION WITH FOREIGN POWER BY THE SPECIAL ASSISTANT TO THE PRESIDENT FOR DISARMAMENT
U. S. DELEGATION TO U. N.
NEGOTIATES
U. S. DELEGATION TO INTERNATIONAL CONFERENCES
NEGOTIATES
ASST. SECRETARY FOR INTERNATIONAL ORGANIZATION AFFAIRS
(Member, President's Special Committee on Disarmament Problems)
Inquiry
Comment
SPECIAL ASSISTANT FOR ATOMIC ENERGY
Inquiry
Comment
ASST. SECRETARY AND DIRECTOR OF POLICY PLANNING STAFF
(Alternate Member, President's Special Committee on Disarmament Problems)
* Units not shown may be consulted.
Inquiry, Comment, or Advice
Direction

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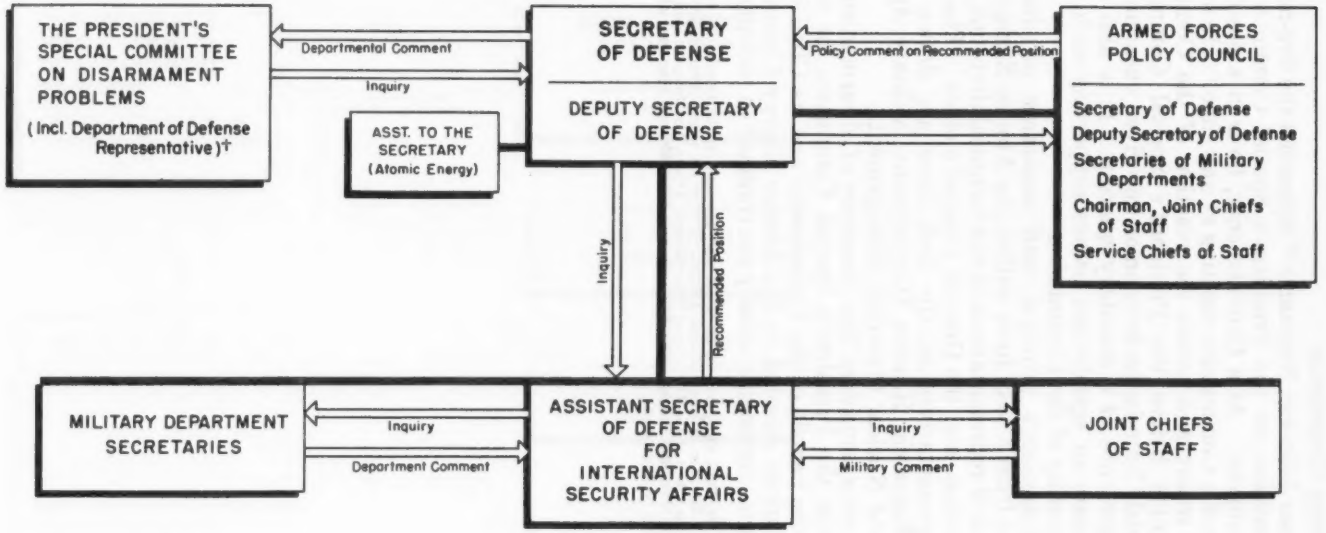
January 25, 1956
No. 1384

Direction

No. 1384

DISARMAMENT: PROCEDURES FOR ITS CONSIDERATION BY THE DEPARTMENT OF DEFENSE*



* Units not shown may be consulted.

† Gen. H.B. Loper, Assistant to the Secretary (Atomic Energy), with staff support from Office of International Security Affairs

Inquiry, Comment, or Advice

Direction

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3. Atomic Energy Commission

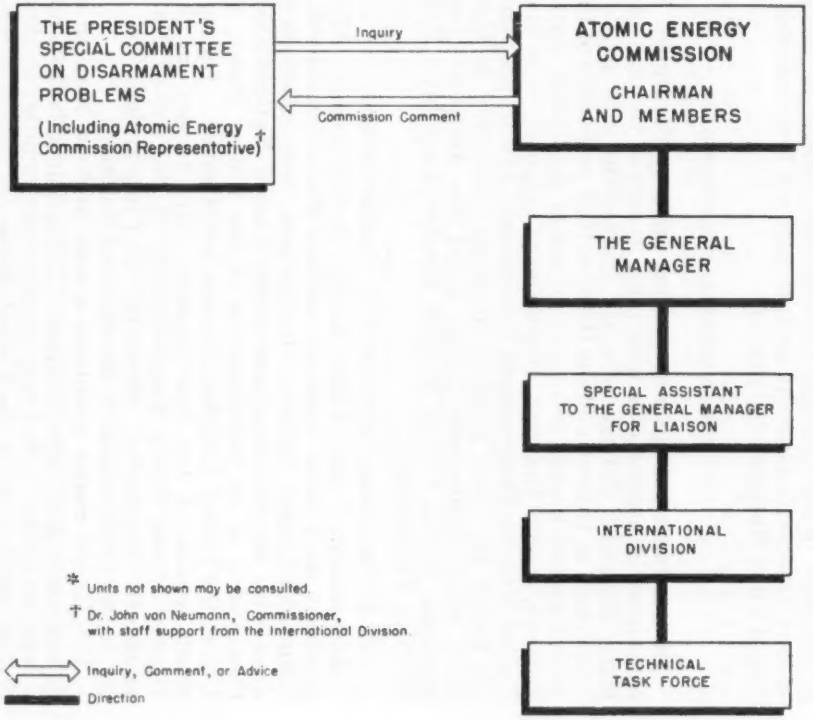
Commissioner John von Neumann [19] represents the five-man Atomic Energy Commission on the President's Special Committee on Disarmament Problems. As a Commissioner, he is in a position to ask for convening of a Commission meeting at any time. He may, therefore, quickly report and secure the reaction of the Commission to proposals coming before the President's Special Committee. To obtain an official Commission decision on any given question, however, requires the presence of a statutory quorum. It is also usual procedure to prepare an agenda and papers supporting each item prior to a formal meeting of the Commission.

Dr. von Neumann's principal staff assistance on disarmament matters comes from a task force within the Atomic Energy Commission, composed of representatives of the technical divisions, the Office of the Commission, and the General Counsel's office. The Technical Divisions' representatives on the task force are drawn from the Divisions of Research, Reactor Development, Military Application, Production, and Nuclear Materials Management.

This task force considers the clearance of disarmament matters emanating from the President's Special Committee, or from other agencies, for the benefit of the Commission and its Chairman. Disarmament inquiries directed to the Atomic Energy Commission and the Commission's comments usually are confined to technical matters.

[19] His alternate is Dr. Paul Fine, and his principal staff assistant on the Committee is Mr. James E. Goodby of the AEC, Division of International Affairs. Within the commission, disarmament matters are cleared through the Chief of the Division of International Affairs, Mr. John A. Hall. He report to Adm. Paul Foster, USN retired, Special Assistant (for liaison) to the General Manager, who is responsible to the Commission and its Chairman.

DISARMAMENT: PROCEDURES FOR ITS CONSIDERATION BY THE ATOMIC ENERGY COMMISSION*


THE PRESIDENT'S SPECIAL COMMITTEE ON DISARMAMENT PROBLEMS
(Including Atomic Energy Commission Representative) †
Inquiry
Commission Comment
ATOMIC ENERGY COMMISSION
CHAIRMAN AND MEMBERS
THE GENERAL MANAGER
SPECIAL ASSISTANT TO THE GENERAL MANAGER FOR LIAISON
INTERNATIONAL DIVISION
TECHNICAL TASK FORCE
* Units not shown may be consulted.
† Dr. John von Neumann, Commissioner, with staff support from the International Division.
Inquiry, Comment, or Advice
Direction

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January 25, 1956
No. 1383

4. Department of Justice

The Department of Justice was made a member of the President's Special Committee on Disarmament Problems in order that it might foresee and render opinions on the legal problems likely to arise in the event of international agreement. The responsibility for the Department's participation rests in the Office of Legal Counsel. So far, no such legal opinions have been rendered on the ground that the questions are hypothetical, nor has departmental personnel participated in the United States delegation to the U. N. Disarmament Subcommittee in New York.

5. United States Information Agency

The United States Information Agency is a member of the President's Special Committee on Disarmament Problems and to that extent participates in the formulation of disarmament policy under the Special Assistant. Its Director also advises the Operations Coordinating Board, at its request, so that the Agency may also play a role in the carrying out of disarmament policy. An instance of USIA work with the Special Assistant for Disarmament is the aerial inspection exhibit recently opened, for the benefit of U. N. delegates, in the lobby of the Carnegie International Center (the office building of the Carnegie Endowment for International Peace) across the street from United Nations headquarters.

F. INTERNATIONAL NEGOTIATIONS

Disarmament policies once decided upon by the United States are considered in negotiations with other countries through usual diplomatic channels, through separate conferences such as the Summit Conference at Geneva and the October 1955 conference of the Foreign Ministers, and mainly in various organs of the United Nations. For instance, recent American disarmament proposals were made in the United Nations Disarmament Commission, and its subcommittee, in the recent Big Four Foreign Ministers Conference in Geneva, and again when Ambassador Lodge urged the American disarmament proposals in the United Nations General Assembly's Political and Security Committee.

1. The United States delegation to the United Nations

Ambassador Henry Cabot Lodge, or his deputy, Mr. Stassen, represent the United States on matters of disarmament which come before the United Nations. In the past, such questions have been dealt with for the most part in the United Nations Disarmament Commission or its Subcommittee of the United States, the Soviet Union, the United Kingdom, France, and Canada. During the most recent session of the Subcommittee, Mr. Stassen, in the role of Deputy United States Representative to the United Nations Disarmament Commission, carried the chief responsibility for this country in the consideration of disarmament questions.

The United States maintains a staff in New York to service its delegation to the United Nations. This group aids the United States delegation to the U. N. Disarmament Subcommittee in obtaining any needed clarification of the United States position by communicating through the State Department's Office of United Nations Political and Security Affairs with the interested officials in Washington. The

Deputy Representative has used his Disarmament Staff in his capacity as Deputy Representative or as Special Assistant either in negotiation with other governments or in seeking clarification and coordination with other U. S. Government agencies.

When the United Nations considers disarmament questions, the regular United States delegation to the United Nations is supplemented by special personnel. They assist Ambassador Lodge or his deputy, Mr. Stassen, in their appearances before the United Nations Disarmament Commission. The special personnel also represent the United States on the Subcommittee of the Commission. During the past year the United States Delegation to the U. N. Disarmament Subcommittee was composed in general of personnel [20] drawn from the President's Special Committee previously mentioned. Mr. Stassen was also assisted by members of the Disarmament Staff.

2. Advance consultation with Allied Nations

Under the terms of various defense treaties in which this country participates, an agreement on armaments into which the United States might be contemplating entering would probably have to be considered in advance with signatories of certain treaties. The North Atlantic Treaty is illustrative of the obligation involved. It provides in article 3 that—

> In order more effectively to achieve the objectives of this Treaty, *the Parties*, separately and jointly, by means of continuous and effective self-help and mutual aid, *will maintain and develop their* individual and collective *capacity to resist* armed attack. 63 Stat. 2242. [Italics added.]

Further, the treaty provides in article 4, that:

> The Parties will consult together whenever, in the opinion of any of them, the territorial integrity, political independence or security of any of the Parties is threatened. Ibid.

If, for example, a proposed disarmament treaty should call for a reduction in the armaments of this country, the provision might be regarded by another party to the North Atlantic Treaty as a threat to its security (i. e., as a weakening of a source of mutual defense) or as a violation of article 3 on the maintaining and developing of capacity to resist armed attack. The United States might, therefore, conceivably be obligated to consult with the other parties to the treaty concerning the proposed reduction. Further, the parties to the North Atlantic Treaty, through the NATO Annual Review, agreed to certain goals for the forces of each member country. If the United States should intend to reduce its armament below any such goal, it would presumably consult the other parties through NATO procedure.

G. LEGISLATIVE CLEARANCE

Proposed disarmament treaties with foreign powers, as well as any legislation necessary to give internal effect to such treaties, would ordinarily be put through the legislative clearance procedure of the

[20] In New York, the State Department had on the delegation Mr. David W. Wainhouse, Deputy Assistant Secretary for International Organization Affairs, and Mr. Howard Meyers. The Department of Defense sent Col. William B. Bailey and an alternate to represent it on the United States delegation. The United States Information Agency was represented by Mr. John Z. Williams, who sat in on the meetings of the President's Special Committee as a "standing request member." The Atomic Energy Commission sent Mr. Edward R. Gardner, Deputy Director of the Office of International Affairs, and Mr. James E. Goodby (principal staff assistant to its committee member) to New York in connection with the work of the delegation, and Dr. von Neumann went up for a meeting near the end of the session.

executive branch. In such procedure, the appropriate executive department or agency prepares the legislative program of bills which it wishes introduced into the Congress during the next session. (Special bills may be added as the session progresses.) Some of these become part of the President's legislative program. The coordination of legislative proposals is handled by the Bureau of the Budget.[21]

A treaty, or international agreement, before execution, would clear through and be initialed by the Legal Adviser of the Department of State. It is his duty to advise the Department as to whether the language of the treaty or agreement expresses the intent of the Department in its negotiations, whether the purpose may legally be achieved by an executive agreement or whether it must be incorporated in a treaty subject to Senate ratification, and whether the agreement or treaty will require implementing legislation.

The Special Assistant to the President for Disarmament is also assigned functions in dealing with Congress on disarmament matters. He is directed by the President where "desirable or appropriate" to secure congressional "concurrences * * * prior to specific action or pronouncement of policy." [22] What effect this directive might have on the regular executive clearance procedures or what it actually implies is unclear. The Special Assistant has not yet taken any official action to secure congressional "concurrences."

If legislation on disarmament were required, the proposed legislation, after satisfying the Bureau of the Budget, would normally be referred to the White House Staff. Before presentation to Congress by the President, it would come presumably within the orbit of Gen. Wilton Persons, the Deputy Assistant to the President, who, with assistants in contact with the Senate and the House, is in general charge of White House legislative liaison. Such legislation would have the benefit of his advice as to how the program should be presented.

H. CONCLUDING OBSERVATIONS

The appointment of a Special Assistant to the President for Disarmament had the effect of transferring the initiative in such affairs, notably in the formulating of disarmament policy, from the Department of State to the Special Assistant. As noted, however, the preexisting executive machinery, depending more heavily on traditional channels of coordination, has not been abolished, but merely held in abeyance.

This would suggest, as would the procedures used in obtaining appropriations, that the office of the Special Assistant and of the Disarmament Staff is regarded as a temporary structure. It is apparently designed to bring a fresh approach to a problem which has long been stalemated in international discussions.

The new office has been functioning less than a year. Both the scope of its authority and its relations to the established departments are not entirely clear. Part of the obscurity stems from the unusual

[21] In this work, the Bureau of the Budget frequently confers with, and works under the policy direction of, Mr. Gerald Morgan, the Special Counsel to the President.
[22] White House press release of March 19, 1955, supra.

status of the Special Assistant. Empowered to coordinate certain work of the executive departments and report directly thereon to the President, he is nevertheless dependent on the Departments for staff, guidance, and even sanction, at least insofar as those departments composing the National Security Council are concerned. It may be of significance in this connection that the Special Assistant has seen fit to begin to develop a staff of his own and to establish task forces of distinguished private citizens to work on various aspects of the problem.

It is significant in assessing the present procedure to consider the extent to which staff members versed in disarmament matters are now brought from many departments and agencies into the entire process of policy. Often, persons from various departments and agencies other than the Department of State who assist in formulating policy now aid in securing its approval and in carrying it out both in presentation and in negotiation with other nations at the United Nations and at international conferences. This has meant some decline in the influence of the Department of State in these matters, but on the other hand, it has opened the possibility of bringing fresh thought and new approaches to the problem.

It remains to be seen whether the appointment of the Special Assistant does have this effect of stimulating the executive procedures to produce more effective policy in matters of disarmament or whether it will merely add one more complexity to an already complex structure. That the preexisting procedures were already heavily laden with participants in consideration of disarmament proposals is indicated by the organizational charts of the interdepartmental machinery and the internal organization within the principal participating departments and agencies.

For the present, the appointment of the Special Assistant appears to be a new manifestation of an old administrative practice, namely, the creation of a temporary coordinating agency to deal with an unsolved problem still under consideration in the old established agencies. The motivations for a creation of this kind are usually well intended. Yet it raises in this case such questions as how a "minister without portfolio" fits into the American system; who is really responsible for the effectiveness or ineffectiveness of our disarmament policies; how to safeguard the integrating procedure established by the National Security Act of 1947 which was designed to insure that foreign and military policy questions reach the President promptly and surrounded by the maximum of information and advice available in the executive branch.

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DISARMAMENT

A SELECTED CHRONOLOGY

JANUARY 1, 1918–MARCH 19, 1956

STAFF STUDY NO. 2

APRIL 20, 1956

PREFACE

By Senator Hubert H. Humphrey, Chairman

The development of nuclear energy has had a tremendous impact on military and foreign policy. I can readily understand, therefore, why so much of the discussion concerning disarmament or the control and reduction of armaments over the past 10 years has centered on the weapons which have been derived from this new source of power.

Spectacular new weapons, however, are only one aspect of the problem. The question is many-sided and in one form or another has been with the human race for a long time.

During the years between World War I and II, attempts to deal with the issue of disarmament were intense and continuous. I am sure they kindled great hopes among the nations and peoples of the world at the time they were made. Today, these attempts are scarcely remembered or, if they are, it is with emphasis on their failure to prevent war. That is the case, for example, with the Washington Naval Treaty of 1922 and the Kellogg-Briand Pact of 1928 which virtually every nation on earth signed in a vain attempt to "outlaw war."

There is a sober warning to the American people in the experiences with disarmament in the past. There is also much in them that is pertinent to the problem as it confronts us today. These past experiences can help us to avoid the pitfalls of either unwarranted optimism or blind futility. They can, in short, provide us with essential historical perspective in dealing with the question of disarmament.

This chronology, Staff Study No. 2, which I have had compiled, is intended to provide a concise and factual outline of developments in disarmament and related events over the past four decades. It was prepared by Virginia W. Brewer, Foreign Affairs Division, Library of Congress, under the direction of the subcommittee staff. In the selection of developments for inclusion in the chronology, emphasis has been placed on those which have most directly involved the United States and our foreign policies. The study is intended for background use. It does not necessarily reflect the views of the subcommittee or any of its members.

APRIL 20, 1956.

DISARMAMENT

A SELECTED CHRONOLOGY: JANUARY 1, 1918–MARCH 19, 1956

1918

Jan. 8: **President Woodrow Wilson propounds "Fourteen Points"—the fourth point envisaging "that national armaments will be reduced to the lowest point consistent with domestic safety."**

1919

June 28: **Treaty of Versailles is signed after World War I by Germany and the Allies.**

Part V provided for a future general limitation of armaments, for a demobilization amounting to the disarmament of Germany, and for the prohibition of the manufacture or importation of poisonous gases and analogous materials. The treaty also provided for Interallied Military, Naval, and Air Commissions of Control of Germany (which were abolished respectively in the following years: Military, 1927; Naval, 1924; Air, 1921).

The Saar Annex of the Treaty of Versailles establishing the Government of the Territory of the Saar (par. 30) provided that "there will be no military service, whether compulsory or voluntary, in the territory of the Saar Basin, and the construction of fortification therein is forbidden. Only a gendarmerie for the maintenance of order may be established. * * *"

The United States Senate rejected the treaty on March 19, 1920. (See January 24, 1921.)

Sept. 10: **Convention for the Control of Traffic in Arms is signed at St. Germain-en-Laye.**

Signatories were: Belgium, Bolivia, the British Empire, China, Cuba, Czechoslovakia, Ecuador, France, Greece, Guatemala, Haiti, the Hedjaz, Italy, Japan, Nicaragua, Panama, Peru, Poland, Portugal, Rumania, the Serb-Croat-Slovene State, Siam, and the United States.

This Convention defined and enumerated armies and dealt with the control of munitions and implements of war, as well as the general trade in them, and included land and sea supervision. Its provisions were closely interwoven with the League of Nations provisions concerning armaments and their control. The Convention never went into effect. It did, however, serve as a basis for subsequent discussion and was used extensively in the preparation of the Convention of June 17, 1925.

1919

Sept. 10: **Treaty of Peace Between the Allied and Associated Powers and Austria is signed at St. Germain-en-Laye.**

The treaty contained provision for a reduction in Austria's armaments, placing a specific limit on the size of the Austrian Army, and banned the manufacture and importation of flame throwers, poisonous gases, and similar materials. This Treaty was typical of the peace treaties after World War I, all of which contained provision for the limitation of the armaments of the defeated countries. (The Treaty of Trianon with Hungary was signed June 4, 1919, and the Treaty of Neuilly with Bulgaria was signed November 27, 1919. The Treaty of Sevres with Turkey never went into effect; it was superseded by the treaty signed at Lausanne July 24, 1923.)

1920

Jan. 10: **Covenant of the League of Nations comes into force.**

Disarmament was among the problems to which the League was expected to devote attention. The Third Committee of the Assembly was assigned responsibility for developing a program for the reduction of armaments.

May 9: **Permanent Advisory Commission on Armaments is created by the League of Nations.**

The Commission was to advise the Council of the League on military matters. Military, Naval, and Aerial Subcommissions were set up at the first session August 3–5, 1920.

Oct. 14: **Peace treaty is signed between Finland and the Russian Soviet Federal Socialist Republic.**

In this treaty and another between these two parties concerning the peace settlement (Aaland Islands Convention of 1921) arrangements for defortification of certain areas and limitation of armaments on the part of Finland only were made. In a 1922 convention both parties agreed to disarmament measures (see June 1, 1922).

1921

Jan. 24: **United States signs separate peace treaty with Germany (following World War I), which encompasses the clauses of the Versailles Treaty covering disarmament.**

Feb. 25: **Temporary Mixed Commission for the Reduction of Armaments is established by a resolution of the Council of the League of Nations.**

The Temporary Mixed Commission was composed of civilians and military experts. It came into being as a result of the proposal of the Norwegian delegation to the Assembly of the League of Nations.

The Commission worked in close cooperation with the Permanent Advisory Commission. Together they pre-

1921

pared a Draft Treaty of Mutual Assistance concerned with mutual defense as a basis of disarmament.

A Committee of Experts on Chemical and Bacteriological Warfare was set up by the Temporary Mixed Commission, whose purpose was "to show to the public opinion of the world the effects which would be produced by the most powerful means of destruction placed at the service of modern warfare by modern science." (It met in Paris in 1924.)

The Temporary Mixed Commission was succeeded by the Coordination Commission. (See October 3, 1924.)

Nov. 12: **Washington Conference on Naval Armaments meets in response to an invitation extended to Great Britain, Japan, France, and Italy by President Harding.**

Invitations were then extended to include China, the Netherlands, Belgium, and Portugal. (See Feb. 6, 1922.)

Dec. 6: **Treaty between Great Britain and Ireland is signed at London.**

Part VIII limited the military defense force of the Irish Free State to such proportion of the military establishments maintained in Great Britain as that which the population of Ireland bore to the population of Great Britain.

1922

Feb. 6: **Limitation of Naval Armaments Treaty is signed by France, Great Britain, Italy, Japan, and the United States, at Washington.**

The treaty limited the total tonnage of aircraft carriers and restricted the total number of capital ships of each of the 5 nations participating, in a ratio of Britain, 5; the United States, 5; Japan, 3; France, 1.67; and Italy, 1.67. A 10-year naval holiday was declared by the signatories during which no new capital ships were to be constructed and none replaced unless they were 20 or more years old.

Treaty * * * To Prevent the Use of Submarines and Noxious Gases in Warfare is signed at Washington by the British Empire, France, Italy, Japan, and the United States.

The treaty was also concerned with the protection of the lives of neutrals and noncombatants at sea in time of war. Consent to ratification was given by the United States Senate, March 29, 1922; but the treaty was not ratified by France and thus never entered into effect.

June 1: **Convention between the Republic of Finland and the Russian Soviet Federal Socialist Republic limits the armed forces of both parties in the frontier zones.**

1922

Sept. 27: **The League of Nations Assembly adopts a resolution embodying principles governing the reduction of armaments.**

The principles enunciated were: (*a*) the reduction must be general; (*b*) no reduction without a safety guaranty; (*c*) safety guaranty possibly by means of a defensive agreement providing immediate assistance from a nearby country; and (*d*) a reduction of armaments as the first condition of a treaty of mutual guaranty which might be brought about by a general treaty or by partial treaties.

Dec. 2: **Disarmament conference meets at Moscow.**

The conference was held at the initiative of the U. S. S. R. and attended by Poland, Estonia, Latvia, Lithuania, and Finland. (Rumania was invited, but did not participate.) The purpose of the conference was to secure a substantial measure of disarmament as between the Soviet Union and neighboring countries. The conference failed to reach agreement.

1923

Feb. 7: **Convention on the Limitation of Armaments of Central American States is signed by Costa Rica, Guatemala, Honduras, Nicaragua, and El Salvador.**

In force from November 24, 1924, it provided that for a period of 5 years the armies of the member countries would be limited to specified numbers (National Guard included); naval and war aircraft were to be limited except in case of civil war or threatened attack from outside; asphyxiating gases and analogous substances or devices were banned; and the contracting governments agreed to submit to one another reports on measures adopted for the execution of this convention.

March 7: **Fifth International Conference of American States commits its members to the prohibition of the use of poisonous gases as provided in the second Washington Treaty.** **(See Feb. 6, 1922.)**

May 3: **League of Nations Temporary Mixed Commission asks the United States to state the general lines on which it would be willing to cooperate in solving the problem of the control of the international trade in arms.**

The answer was confined to a reiteration of the view that the United States Government did not have the constitutional power to enter into a treaty providing for the control of private manufacture of arms.

In 1932 the United States delegation to the Disarmament Conference was instructed by the Secretary of State that the earlier position was not well taken and that in view of ratification of recent treaties and decisions of the Supreme Court the Government did have the power to enter into such a treaty.

1923

May 23: **Continental Treaty for the Avoidance or Prevention of Conflicts Between American States is signed at Santiago de Chile.**

The treaty was signed by Argentina, Brazil, Chile, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Nicaragua, Panama, Paraguay, the United States, Uruguay, and Venezuela. It did not lay down any fixed total for military armament but sought to insure pacific settlement of disputes, and provided that the signatory states would not mobilize or concentrate troops on their frontiers.

July 7: **League of Nations Council authorizes the publication of a military yearbook.**

On September 27, 1923, the Temporary Mixed Commission submitted for publication statistical material on the armaments in different countries which had been collected from various official sources. To this was added information on the imports and exports of arms from all governments, which the Secretary General was instructed by the League of Nations Council to collect and to publish. This was the beginning of the Armaments Yearbook, which was published annually until 1939–40.

July 24: **Convention on the Regime of the Straits is signed at Lausanne by Bulgaria, France, Great Britain, Greece, Italy, Japan, Rumania, Russia, Turkey, and Yugoslavia.**

This treaty, signed the same day as the peace treaty of Lausanne, provided in part for the demilitarization of various areas in the regions near Turkey, specifically those adjoining the European frontier, the Dardanelles, and the Bosporus.

Sept. 27: **League of Nations Assembly begins consideration of Draft Treaty of Mutual Assistance.**

The draft treaty put forward the following principles: (1) That disarmament must be general; (2) that disarmament must depend on satisfactory guaranties of security; (3) that such guaranties must be general; (4) that such guaranties must be made conditional on the reduction of armaments.

With respect to this draft the United States took the position that since the fundamental principle of the draft treaty was to provide guaranties of mutual assistance under the authority of the Council of the League, and since the United States was not a member of the League of Nations, the United States would not find it possible to adhere to the treaty.

1924

Oct. 2: **Geneva Protocol, 1924, for the pacific settlement of international disputes is unanimously recommended by the League of Nations.**

The protocol provided for compulsory arbitration of all disputes and defined the aggressor as the nation unwilling to submit its case to arbitration. Among its provisions was one for participation in an international conference. This protocol was finally rejected.

Oct. 3: **Coordination Commission is constituted by the League of Nations.**

The Coordination Commission replaced the Temporary Mixed Commission in dealing with disarmament questions. It met only from February 16 to 18, 1925, and was dissolved. (See February 25, 1921.)

1925

June 17: **Convention for the Supervision of the International Trade in Arms, Ammunition, and Implements of War is signed at Geneva.**

The convention, frequently referred to as the Arms Traffic Convention, was approved on June 6, 1935, by the United States Senate and ratified with reservations. Also ratifying with reservations were the British Empire, Denmark, France, and Sweden. The following countries ratified without reservations: Bulgaria, Canada, China, Egypt, Latvia, the Netherlands, Poland, Spain, and Venezuela. However, since only 9 of the 14 ratifications required were without reservations, the convention did not enter into force.

Protocol for the Prohibition of the Use of Asphyxiating, Poisonous, or Other Gases and Bacteriological Methods of Warfare is signed at Geneva.

The protocol entered into force on February 8, 1928, and by 1938 was adhered to by 41 States. The United States signed the protocol but did not ratify it. The Senate objected on grounds largely unrelated to the intent of the protocol.

Oct. 16: **Locarno Treaties of arbitration and mutual guaranty are signed by Belgium, Czechoslovakia, France, Germany, Great Britain, Italy, and Poland.**

A series of similar pacts was signed by the U. S. S. R. with neighboring countries between 1926 and 1932. All of these security treaties were widely regarded at the time as a prelude to general disarmament.

1925

Dec. 12: **Preparatory Commission is constituted by the Council of the League of Nations "to prepare for a conference on the reduction and limitation of armaments."**

The Preparatory Commission held sessions from May 18, 1926, to December 1930 to prepare for the disarmament conference. The United States participated in the deliberations of the Commission from 1926 onward. Soviet representatives were present from 1927 onward.

1927

Mar. 25: **Preparatory Commission on Disarmament adjourns after the British and French delegations present preliminary drafts of a convention on limitation and reduction of armaments from which the draft convention later developed.**

June 20: **Geneva Naval Conference (or "Coolidge Conference") meets at the suggestion of President Coolidge to discuss limiting construction of types of vessels not covered by the Washington Agreement of 1922.**

Great Britain and Japan participated, but France and Italy refused. The Conference failed to reach agreement.

Nov. 30: **Committee on Arbitration and Security is constituted by the Preparatory Commission for the Disarmament Conference.**

The duty of the Committee was "to consider * * * measures capable of giving all states the guarantees of arbitration and security necessary to enable them to fix the level of their armaments at the lowest possible figures in an international disarmament agreement."

The Committee held periodic meetings from December 1, 1927, through July 4, 1928, and again April 28–May 9, 1930.

Dec. 3: **During a session of the Preparatory Commission at Geneva, the Soviet Union proposes complete and immediate disarmament.**

The proposal made by Maxim Litvinov was generally mistrusted and resisted by all but the German and Turkish delegations.

1928

July 8: **Anglo-French naval compromise of 1928 is announced in the British House of Commons.**

In addition to the agreed provisions limiting naval armaments between the two countries, there were those dealing with land and air armaments; but on these matters there was no agreement.

1928

Aug. 27: **Treaty for the Renunciation of War (Kellogg-Briand Pact or Pact of Paris) is signed by Australia, Belgium, Canada, Czechoslovakia, France, Germany, Great Britain, India, Irish Free State, Italy, Japan, New Zealand, Poland, Union of South Africa, and the United States.**

At the same time, the Governments of France and the United States issued invitations to 48 other states to join with the original signatories in adhering to the document.

The Soviet Union deposited its adherence on August 31, 1928. By 1930 all self-governing states, with the exception of three South American Republics, had adhered to the pact.

1929

Feb. 9: **Protocol for putting into force the Treaty for the Renunciation of War (the "Litvinov Protocol") is signed in Moscow by Estonia, Latvia, Lithuania, Poland, Rumania, and the Soviet Union.**

The pact was similar in provision and intent to the Kellogg-Briand Pact, the stipulations of which it sought to bring into effect between the Soviet Union and its neighboring states. (See August 27, 1928.)

1930

Apr. 22: **Treaty for the Limitation and Reduction of Naval Armament is signed in London by Great Britain, the United States, France, Italy, and Japan.**

The treaty sought to regulate submarine warfare and extended the limitations provided for by the Washington Treaty of 1922. The United States, Great Britain, and Japan agreed to scrap certain warships by 1933 and allocate tonnage in heavy cruisers to a 10–10–6 ratio, with parity granted in submarines. The agreements were to run until 1936.

Ratifications were deposited by the United States (July 21, 1930), Great Britain, the British Dominions, India, the Irish Free State, and Japan. France and Italy ratified only relatively unimportant clauses.

Oct. 30: **Greece and Turkey sign a protocol designed to prevent competition in naval armaments (the "Angora Protocol").**

Dec. 9: **Preparatory Commission on Disarmament adopts a draft convention to be submitted to a disarmament conference in February 1932.**

The outstanding provisions of the draft convention were: (*a*) the military personnel of states were to be subject to limitation, without regard, however, to the size of each state's trained reserves; (*b*) the period of service for conscript forces was to be limited; (*c*) land war material was to be subject to budgetary limitation; (*d*) naval war material was to be limited in accordance with the terms of the

Washington Conference (1922) and the London Naval Conference (1930); (*e*) air armaments were to be restricted according to horsepower; (*f*) chemical and bacteriological warfare were to be prohibited; (*g*) a permanent Disarmament Commission was to be established.

1931

Mar. 7: **Turkey and the Soviet Union sign a protocol designed to prevent competition in naval armaments.**

Sept. 18: **Japanese troops begin offensive in Manchuria.**

1932

Feb. 2: **Conference for the Reduction and Limitation of Armaments or general "Disarmament Conference" of the League of Nations meets at Geneva.**

Sixty nations were represented including the United States. The Conference or subsidiary bodies continued meeting until May 31, 1937. (See also May 31, 1937.)

Mar. 15: **Political Commission of the Disarmament Conference appoints a Committee on Moral Disarmament.**

This Committee, formed at the instigation of Poland, was to consider measures which governments might take in order to insure that public information, imparted by means of the press, broadcasting, or the cinema, might be inspired with mutual respect and good understanding between nations.

June 22: **President Hoover sends a statement to the Disarmament Conference, suggesting that while existing relativity in armaments should be preserved, reduction contemplated by the Conference must be real and must effect economic relief.**

On the basis of these proposals by President Hoover, the United States delegation to the Conference proposed that the world arms level should be reduced by almost one-third.

July 23: **Disarmament Conference makes a pronouncement in favor of a substantial reduction of armaments, the prohibition of certain methods of war, including chemical, incendiary, and bacteriological weapons, and makes a distinction between "defensive" and "offensive" weapons (the latter to be ultimately abolished).**

1933

Mar. 27: **Japan announces its withdrawal from the League of Nations.**

May 19: **President Roosevelt sends a message to the Disarmament Conference.**

The aim of the Conference, he envisaged, "must be the complete elimination of offensive weapons." He suggested that pending agreement on disarmament measures, no state should actually increase its armaments and that all nations should enter into a solemn nonaggression pact.

1933

June 8: **New draft convention based on British proposals is unanimously accepted by the Disarmament Conference as a basis for the future convention.**

The draft convention called for the limitation and reduction of war materials and forces, with exact figures suggested for each of the European states; for the reduction of tonnage and firepower of warships and destroyers, and the complete abolition of submarines; and for the limitation of the number of aircraft, providing ultimately for the complete abolition of military and naval aircraft.

Oct. 19: **Germany announces withdrawal from the Disarmament Conference and from the League of Nations (October 23).**

1934

Apr. 12: **United States Senate authorizes Senate Munitions Investigating Committee to inquire into the manufacture of and traffic in arms.**

The hearings held by this committee under the chairmanship of Senator Gerald P. Nye "set the domestic background" for the neutrality legislation of 1935, 1936, and 1937. (See August 31, 1935.)

May 28: **United States Congress by Joint Resolution authorizes the President to prohibit the sale of arms to the countries engaged in the Chaco Dispute between Bolivia and Paraguay.**

May 29: **Disarmament Conference assembles for the last time.**

The Conference met until June 16 and several special subcommittees were established to make further study of various aspects of the disarmament problem. The Bureau of the Disarmament Conference continued in existence (but held few meetings) until May 31, 1937.

Dec. 29: **Japan gives notice that on December 31, 1936, it will terminate the Naval Limitation Treaty of 1922.**

1935

Mar. 16: **Germany denounces clauses of the Treaty of Versailles concerning disarmament.**

Germany contended this step was based on the failure of the other powers to disarm as provided in the peace treaty. The League of Nations formally condemned this unilateral repudiation of the Versailles Treaty by Germany.

June 18: **Anglo-German Naval Agreement sets a ratio respecting the naval armaments of these two Governments.**

Aug. 31: **United States puts into effect the Neutrality Act of 1935, the first of a series of such laws forbidding or regulating the export of munitions to belligerents.**

Other Neutrality Acts were passed in 1936, 1937, and 1939.

1935

Oct. 2: **Ethiopia notifies the League of Nations that Italian troops have violated her borders.**

Oct. 11: **League of Nations Assembly votes sanctions against Italy, for having "resorted to war in disregard of Article XII" of the League Covenant.**

Though the decision was made to apply article XVI of the League Covenant providing for sanctions, neither military sanctions nor a naval blockade were invoked. The series of gradual and selective economic sanctions applied were made ineffective by the omission of some minerals that were critically important to Italy, such as petroleum and copper.

1936

Mar. 7: **Germany reoccupies the Rhineland in violation of the Treaty of Versailles and the Locarno Treaties.**

Mar. 25: **Treaty for the Limitation of Naval Armaments is signed at London.**

This treaty was "to make provision for the limitation of naval armament, and for the exchange of information concerning naval construction * * * ." It was signed by Australia, Canada, France, Great Britain, India, New Zealand, and the United States, "in view of the forthcoming expiration of" the Treaties for the Limitation of Armaments of 1922 and 1930.

July 18: **Civil war breaks out in Spain.**

July 20: **Montreux Convention replaces the Treaty of Lausanne (1923) and gives Turkey the right to remilitarize the zones around the Straits of the Dardanelles and the Bosporus.**

1937

May 31: **Bureau of the Disarmament Conference holds its last meeting.**

July 7: **Fighting breaks out between the Chinese and Japanese in North China marking the beginning of the Sino-Japanese War.**

Without declaring war Japan invaded China and by March 1939 was in occupation of large tracts of Chinese territory south of the Great Wall.

July 17: **United Kingdom signs bilateral agreements with Germany and the U. S. S. R. concerning naval armaments.**

The agreements followed the London Naval Treaty of 1936 in some respects but excepted certain categories of vessels. Pursuant to this and the 1935 agreement, Germany commenced rebuilding its navy.

1938

Mar. 13: **Germany annexes Austria.**

Sept. 30: **Munich Agreement is signed.**
Great Britain was represented by Prime Minister Chamberlain, France by Premier Daladier, Germany by Hitler. Mussolini was an observer. The agreement led to the dismemberment of Czechoslovakia.

1939

Aug. 23: **Nazi-Soviet pact of nonaggression is signed.**

Sept. 1: **World War II begins with the German invasion of Poland.**
The Soviet Union joined in the attack on September 17, 1939.

Nov. 4: **United States Neutrality Act is modified to end the embargo on shipments of arms to belligerents and authorization is provided for "cash and carry" exports of arms.**

Nov. 30: **Soviet Union invades Finland.**

1940

Sept. 27: **Germany, Italy, and Japan conclude a three-power pact, at Berlin, pledging total aid for a period of ten years [the "Tripartite Pact"].**

1941

June 22: **Germany invades the Soviet Union.**

Aug. 14: **Prime Minister Churchill and President Roosevelt declare eight principles for a better future for the world (the Atlantic Charter).**
One of these principles was: To disarm the aggressor nations pending the establishment of a wider and permanent system of general security and at the same time to aid and encourage all practicable measures for lightening the burden of armaments for all peace-loving peoples.

Dec. 7: **Japan attacks the United States at Pearl Harbor.**
The attack was followed by a declaration of war against Japan by the United States on December 8. On December 11, Germany and Italy declared war on the United States.

1942

Jan. 1: **Twenty-six nations sign the Declaration of United Nations, at Washington.**
The signatories subscribed to "a common program of purposes and principles embodied in" the Atlantic Charter and pledged to cooperate fully in the war against the members of the Tripartite Pact.

1944

Aug. 21: **Dumbarton Oaks Conference meets in Washington, to consider the means of maintaining international peace and security upon the conclusion of World War II.**

The Conference was attended by representatives of China, Great Britain, the Union of Soviet Socialist Republics, and the United States. It laid the groundwork for the United Nations and envisioned many of the proposals including those respecting disarmament later embodied in its charter. The conference adjourned October 7.

1945

Feb. 11: **Crimean (Yalta) Conference Protocol is signed by President Roosevelt, Prime Minister Churchill, and Premier Stalin, section III providing for the complete disarmament of Germany.**

May 7: **Germany surrenders.**

June 26: **Charter of the United Nations is signed.**

The charter came into force on October 24, 1945. It assigned the United Nations major responsibilities in the field of disarmament, peaceful settlement, and enforcement.

Aug. 1: **Berlin (Potsdam) Conference Protocol is signed by President Truman, Premier Stalin, and Prime Minister Attlee.**

Among its provisions were those for the abolition of all German armed forces, the destruction of all German armaments, and elimination or control of all German industry that could be used for military production, to the end that Germany should be completely disarmed and demilitarized.

Aug. 6: **Atomic bomb is dropped on Hiroshima, after prior warning is given to Japan to evacuate principal cities.**

President Truman, in a subsequent announcement, said: "I shall recommend that the Congress of the United States consider promptly the establishment of an appropriate commission to control the production and the use of atomic energy within the United States. I shall give further consideration and make further recommendations to the Congress as to how atomic power can become a powerful and forceful influence toward the maintenance of world peace."

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1945

Aug. 9: **President Truman sets forth the United States position on the atomic bomb.**

"The atomic bomb," he said, "is too dangerous to be loose in a lawless world. That is why Great Britain and the United States, who have the secret of its production, do not intend to reveal the secret until means have been found to control the bomb so as to protect ourselves and the rest of the world from the danger of total destruction * * *.

"We must constitute ourselves trustees of this new force—to prevent its misuse, and to turn it into the channels of service to mankind."

Sept. 2: **Japan signs formal terms of surrender.**

On July 26, 1946, Japan was offered formal surrender terms by the United States, Great Britain, and China. These terms included provision for complete disarmament of Japanese military forces, and gave warning that "complete destruction, * * * utter devastation, * * * annihilation" not only of armed forces but also of the homeland would result if Japan refused the terms offered.

Oct. 3: **Four-Nation declaration on general security is signed at Moscow by the United States, the United Kingdom, the Soviet Union, and China.**

The declaration included a clause aimed to insure "the least diversion of the world's human and economic resources for armaments" and "to bring about a practical agreement with respect to the regulation of armaments in the postwar period."

Nov. 15: **Three-Power declaration on atomic energy is issued at Washington, D. C., by the President of the United States, the Prime Minister of the United Kingdom, and the Prime Minister of Canada.**

The declaration stated: "We are prepared to share, on a reciprocal basis with others of the United Nations, detailed information concerning the practical industrial application of atomic energy just as soon as effective enforceable safeguards against its use for destructive purposes can be devised * * *."

Dec. 27: **Soviet Union concurs in the principles outlined in the Declaration of November 15, 1945, and becomes a cosponsor of a resolution calling for the establishment of a U. N. Atomic Energy Commission by the U. N. General Assembly.**

1946

Jan. 24: **U. N. General Assembly creates the Atomic Energy Commission by unanimous resolution.**

The Commission was to consist of all members of the Security Council together with Canada when it was not a member of the Security Council. Its principal task was to work out a plan under which nations would agree to place the production of atomic energy under international control, so as to insure its use for peaceful purposes only, and to bring about the total prohibition of atomic weapons and all other weapons of mass destruction.

June 14: **Bernard M. Baruch, in U. N. Atomic Energy Commission, outlines a United States plan for control of atomic energy.**

In the plan, which was based on the Acheson-Lilienthal report of March 16, 1946, the United States proposed the creation of an International Atomic Development Authority, to which would be entrusted all phases of the development and use of atomic energy with managerial control of potentially dangerous atomic energy activities and power to control, inspect, and license all other atomic activities.

The United States proposed that once an adequate system of control was agreed upon, manufacture of atomic bombs would stop, existing bombs would be disposed of, and the authority would be in possession of full information for the production of atomic energy.

June 19: **Soviet Union advocates a convention providing for the outlawing of the production and use of atomic weapons.**

The proposed convention provided for the destruction of all stocks of atomic weapons within a period of 3 months after its adoption and the enactment of national enforcement legislation within 6 months. This was to be followed by further consideration by the Commission of means of exchanging information and possible methods of control.

Aug. 1: **United States Atomic Energy Control Act (the McMahon Act) becomes effective.**

The act provided for the establishment of a civilian Atomic Energy Commission to own and control on behalf of the United States all resources and developments in atomic energy in the United States of America.

The Commission (appointed October 28, 1946) was to take over atomic production and control from the Army on January 1, 1947.

1946

Dec. 14: **U. N. General Assembly adopts unanimously a resolution, based on a United States proposal, calling on the Security Council to give prompt consideration to the problem of safeguards in connection with the control of atomic energy and the regulation and reduction of armaments.**

1947

Feb. 13: **Security Council votes, 10–0, with the Soviet Union abstaining, to establish a Commission for Conventional Armaments.**

May 3: **Constitution of Japan (1947) is adopted renouncing war and the threat or use of force as a means of settling international disputes, and providing that "land, sea, and air forces, as well as other war potential, will never be maintained." (Art. 9.)**

June 11: **U. S. S. R. makes additional proposals for an international agreement on the control of atomic energy.**

The proposals elaborated those offered the previous year (see June 19, 1946), and endorsed the concept of an international control commission, within the framework of the U. N. Security Council, however, where the veto would apply.

Sept. 2: **Inter-American Treaty of Reciprocal Assistance is signed at Rio de Janeiro by 21 American Republics.**

The treaty provided that an armed attack against any American state would be considered as an attack on all American states and each agreed to undertake to assist in meeting such attack. It also provided for consultation and action, not only in the event of armed attacks and other acts of aggression, but whenever any other fact or situation might endanger the peace of the Americas.

1948

Mar. 17: **The Brussels Treaty is signed by Belgium, France, Luxembourg, the Netherlands, and the United Kingdom.**

The 50-year treaty made provision for economic, social, and cultural collaboration and collective defense. It became the basis for subsequent European collaboration including armaments control arrangements under the Western European Union.

Mar. 30: **Control Committee of the U. N. Atomic Energy Commission adjourns indefinitely.**

Delegates from the United States, Great Britain, France, Belgium, and Canada asserted that there was no use prolonging a stalemated debate and placed the blame for the impasse on the Soviet Union's refusal to accept the majority's atomic control plan. The Commission, however, was not dissolved. In its third report on May 17, 1948, the Commission stated that it had reached an "impasse."

1948

June 11: **"Vandenberg Resolution" is adopted by the Senate by a vote of 64 to 4.**

The resolution called for universal regulation and reduction of armaments, for the use of armed force only in the common interest, and for the progressive development of regional and other collective arrangements for self-defense in accordance with the United Nations Charter.

Aug. 12: **U. N. Commission for Conventional Armaments recommends principles for a system for regulating and reducing armaments and armed forces.**

Among the principles were those declaring that a system must provide for adherence of all states and initially must include all states having substantial military resources, and that it could be put into effect only in an atmosphere of international confidence.

Oct. 2: **Soviet Union proposes that the U. N. Atomic Energy Commission resume work and write two conventions—one to prohibit atomic weapons and one to provide international atomic controls.**

Oct. 19: **Western Powers agree to revive the suspended U. N. Atomic Energy Commission.**

Oct. 20: **U. N. Political Committee rejects Soviet resolution for simultaneous conventions on prohibition of atomic weapons and control of atomic energy.**

Nov. 4: **U. N. General Assembly approves the plan of the Atomic Energy Commission, based upon United States proposal.**

Under this plan an international agency would control the production of atomic energy and raw materials, grant licenses to states to set up atomic undertakings for peaceful purposes, and inspect the territories of all nations to prevent and detect secret production of atomic energy and other violations of the agreed plan.

Only the Soviet bloc voted against the plan, holding that it would give the international control agency arbitrary control over the life and development of other states.

Nov. 19: **General Assembly recommends that the Security Council make a study of and proposals for an arms census.**

1949

Feb. 10: **U. N. Security Council votes for the resumption of work by the U. N. Commission for Conventional Armaments with emphasis on gathering and verifying military data from all U. N. members.**

Feb. 18: **U. N. Atomic Energy Commission resumes meetings after 9 months.**

1949

Feb. 25: **U. S. S. R. calls for "preparation of a draft convention for the prohibition of atomic weapons and a draft convention for the control of atomic energy," both conventions to be concluded and to come into force simultaneously.**

Feb. 26: **Export Control Act of United States gives the President authority to regulate the export of strategic materials.**

This act was extended by acts of Congress dated May 16, 1951, and June 16, 1953.

Apr. 4: **North Atlantic Treaty is signed in Washington.**

Signatories were Belgium, Canada, Denmark, France, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, United Kingdom, and the United States. The treaty was later adhered to by Greece, Turkey, and the Federal Republic of Germany. The parties agreed that an armed attack in the North Atlantic area against one or more of them would be regarded as an attack against them all. Each one undertook to assist the attacked by taking such action as it deemed necessary, including the use of armed force. The parties, furthermore, pledged to maintain and develop their individual and collective capacity to resist armed attack.

July 7: **France proposes creation of an agency free of the veto to plan a world-wide census of non-atomic weapons and armed forces.**

July 29: **U. N. Atomic Energy Commission decides to suspend its work indefinitely.**

After two dozen formal sessions and hundreds of committee meetings, the Commission voted 9 to 2, with the U. S. S. R. and the Soviet Ukraine opposing, to call off its negotiations on the international control of atomic energy "until such time as the sponsoring powers have reported that there exists a basis for agreement."

Sept. 23: **President Truman announces that the United States Government has evidence that an atomic explosion has taken place in the U. S. S. R.**

Oct. 11: **Soviet Union vetoes proposal for a verified census of the world's non-atomic armaments and armed forces.**

Nov. 23: **U. N. General Assembly votes 49 to 5 (the Soviet bloc opposed) in support of the majority plan for atomic control, largely based on United States proposals.**

Dec. 1: **U. N. General Assembly adopts "Essentials of Peace" resolution in which members pledge to settle international disputes by peaceful means and to seek international control of armaments.**

1949

Dec. 5: **U. N. General Assembly (the Soviet bloc opposed) asks the Security Council to continue study of means to regulate the world's armed forces and conventional armaments.**

Dec. 15: **U. N. General Assembly approves the proposals formulated by the Commission for Conventional Armaments.**

1950

Jan. 19: **Soviet representative withdraws from the U. N. Atomic Energy Commission.**

A Soviet move to have the Chinese Nationalist representative unseated having failed, the U. S. S. R. announced that it would withdraw, stating that it would not recognize as lawful any recommendation adopted by that body as long as Nationalist China continued to participate. The withdrawal was one of many from U. N. organs which the Soviet Union made at that time. Subsequently participation was resumed.

Mar. 19: **Communist-sponsored World Congress of Partisans of Peace, convening in Stockholm, Sweden, adopts the "Stockholm Resolution."**

The resolution embodied three demands: prohibition of atomic weapons; "strict international control" of the atom bomb; and condemnation as a war criminal of the first government to use atomic weapons.

May 25: **France, the United Kingdom, and the United States announce Tripartite Declaration regarding security in the Near East.**

The three powers declared their opposition to an arms race between the Arab States and Israel. The powers stated all applications for arms from these countries would be regarded in the light of the defense needs of the area as a whole and the necessity for self-defense purposes.

June 25: **Korean conflict begins with an invasion of Communist forces from North Korea across the 38th parallel.**

The action brought passage within 7 hours, by the U. N. Security Council (the U. S. S. R. absent), of a resolution which paved the way for armed assistance to the Republic of Korea by United States forces together with 15 others of the United Nations.

Oct. 23: **Soviet representative introduces in the U. N. General Assembly a proposal for "the strengthening of peace."**

Under the proposal the General Assembly was asked to condemn war propaganda and prohibit atomic weapons, with the provision that the first power to use them would be treated as a war criminal. The proposal also sought a peace pact among the five Great Powers and, as a first step toward disarmament, reduction of their armed forces by one-third within one year. It was rejected by the General Assembly on October 30.

1950

Oct. 24: **President Truman suggests a new approach to the task of disarmament by merging the work of the Atomic Energy Commission and the Commission for Conventional Armaments.**

He outlined as basic principles upon which any successful plan for disarmament must rest the following points: "The plan must include all kinds of weapons * * *; the plan must be based on unanimous agreement; * * * disarmament must be based on safeguards which will insure the compliance of all nations. The safeguards must be adequate to give immediate warning of any threatened violation; disarmament must be policed continuously and thoroughly; it must be founded upon free and open interchange of information across national borders."

Nov. 3: **U. N. General Assembly adopts "Uniting for Peace" Resolution.**

The resolution established a 14-member Peace Observation Committee and a 14-member Collective Measures Committee for strengthening international peace in accordance with the charter. It specifically recommended earmarking national units which could be made available under United Nations resolutions for maintaining peace.

Nov. 17: **U. N. General Assembly adopts "Peace Through Deeds" Resolution.**

The Assembly held that the goals of international control of aggression, regulation of armaments and elimination of weapons of mass destruction under the United Nations and the diversion of resources from armaments to developments for the general welfare could be achieved if member nations would demonstrate their will to achieve peace through deeds.

1951

Mar. 14: **President Truman endorses proposals for progressive disarmament advanced by Senator Ralph E. Flanders and supported by 23 Members of the United States Congress.**

In a letter to the President, the Members of Congress urged that the United States make proposals for the establishment of a U. N. Commission for progressive disarmament, for the establishment of a U. N. police force, for complete disarmament under U. N. supervision, and for leaving this disarmament offer permanently open until world acceptance. In endorsing the proposals, the President said, however, that the United States must build up strength in case a war should be forced upon us, since the U. S. S. R. was building up its armaments.

May 15: **Concurrent Resolution of the United States Congress urges that the U. N. General Assembly take action to put an embargo on arms and other strategic material to Communist China.**

1951

May 18: **U. N. General Assembly adopts resolution calling for an embargo by U. N. members against shipments of strategic materials to Communist China and North Korea.**

Sept. 1: **Australia, New Zealand, and the United States sign a Security Treaty at San Francisco.**

Sept. 8: **United States and Japan sign a security treaty in which the avoidance of "armament which could be an offensive threat" is mentioned at the same time that provision is made for defensive forces.**

Oct. 26: **Mutual Defense Assistance Control Act is adopted by the United States.**

The act provided for an embargo on the shipment of arms and other strategic materials to any nation threatening the security of the United States. It declared the policy of the United States to be to withhold military, economic, or financial assistance from nations which did not apply a similar embargo, except when the President determined the cessation of aid would be detrimental to the security of the United States. It also called for support of efforts of the United Nations to prevent the shipment of certain commodities to countries engaged in hostilities against the United Nations (Battle Act).

Dec. 21: **After an exchange of notes with the United States, France, Great Britain, and other western signatories, Italy declares revision of the Treaty of Peace of 1947 is complete and the restrictive military clauses no longer apply.**

1952

Jan. 11: **U. N. General Assembly votes to establish a single Disarmament Commission to replace the Atomic Energy Commission and the Commission for Conventional Armaments.**

The new Commission was to be composed of the members of the Security Council plus Canada. It was directed to prepare draft proposals to be embodied in a treaty or treaties for submission to a conference of all states. On February 4, the new Commission convened for the first time.

Jan. 19: **U. N. General Assembly transmits to the Disarmament Commission revised proposals of the U. S. S. R. on atomic and conventional armaments.**

The proposals included prohibition of nuclear weapons and the establishment of international control over enforcement, with instructions to the Disarmament Commission to prepare, not later than June 1, 1952, a draft convention providing implementing measures.

1952

Apr. 2: **General Eisenhower, the Supreme Allied Commander in Europe, makes first report to the NATO countries.**

He declared: "Visible and within grasp we have the capability of building such military, economic, and moral strength as the Communist world would never dare to challenge. When that point is reached, the Iron Curtain rulers may finally be willing to participate seriously in disarmament negotiations. Then we may see fulfilled the universal hope expressed in the United Nations Charter to reduce 'the diversion for armaments of the world's human and economic resources.' "

Apr. 4: **Two committees are set up by the U. N. Disarmament Commission.**

Committee I was to deal with the regulation of all armaments and armed forces; Committee II was to deal with disclosures and verification of all armaments, including atomic armaments, and of all armed forces.

Apr. 5: **United States introduces "Proposals for Progressive and Continuous Disclosure and Verification of Armed Forces and Armaments."**

The proposals were introduced as a working paper in the Disarmament Commission. They dealt with the problem of advance warning against violations and methods for verification, including aerial surveys and ground inspectors. The Soviet representative on the Commission objected to the proposed system of inspection and to the phasing on atomic disclosures.

Apr. 8: **Soviet Union modifies proposals on world disarmament.**

The Soviet delegate proposed that the prohibition of weapons of mass destruction and the establishment of control should come into effect simultaneously. He suggested that "continuous inspection" be undertaken by an international control organ but "without interference in domestic affairs of states."

Apr. 24: **United States introduces in the Disarmament Commission the "Essential Principles of a Disarmament Program."**

The United States held that in a disarmed world, states must refrain from the use of force or the threat of force as an instrument of national or ideological policy. Armed forces and armaments should be reduced to such a point that no state would be in a position to start a war or to undertake the preparations for war without the long previous knowledge of other states, or be in a position to commit any act of physical aggression against any other state. International agreements should bind all states to such terms as would further progress toward the disarmament goals, i. e., an effective international system of disclosure and verification of all armed forces and armaments including atomic and international control.

1952

May 28: **France, the United Kingdom, and the United States submit a working paper containing a formula for numerical limitation of all armed forces.**

The working formula, suggested as a basis of discussion, provided for a maximum of between one and one and a half million men each for the total strength of the armed forces of the United States, the U. S. S. R., and China, and between 700,000 and 800,000 each for Great Britain and France. All other states would have agreed maxima, normally less than one percent of each country's population. The plan also specified various safeguards and was supplemented with proposals aimed to prevent undue concentration of permitted forces. The Soviet Union rejected the proposals on August 12, 1952.

Aug. 12: **United States, United Kingdom, and France suggest holding a five-power disarmament conference.**

The purpose of the suggested conference was to negotiate on the distribution of armed forces, types and quantities of armament, elimination of major weapons adaptable to mass destruction, and effective international control of atomic energy.

On August 29 Soviet Representative Malik rejected the western proposal for a five-power conference.

Nov. 1: **United States tests first hydrogen bomb at Eniwetok.**

1953

Apr. 16: **President Eisenhower announces that "* * * this Government is ready to ask its people to join with all nations in devoting a substantial percentage of any savings achieved by real disarmament to a fund for world aid and reconstruction * * *."**

July 27: **Korean truce talks, which began on July 10, 1951, result in an armistice.**

July 29: **United States Senate Resolution 150 on world disarmament passes unanimously.**

The resolution stated "that it continues to be the declared purpose of the United States to obtain within the United Nations, agreements by all nations for enforceable world disarmament." It further called for a plan for the transfer of resources and manpower now being used for arms to constructive ends at home and abroad.

Aug. 20: **Soviet Government announces that it has tested a hydrogen bomb "within the last few days."**

1953

Dec. 8: **President Eisenhower, in a speech before the U. N. General Assembly, proposes an "Atoms for Peace" plan for the international development of the peaceful uses of atomic energy.**

The President suggested, "The governments principally involved, to the extent permitted by elementary prudence, to begin now and continue to make joint contributions from their stockpiles of normal uranium and fissionable materials to an International Atomic Energy Agency" set up under the aegis of the United Nations. Under the plan experts would be mobilized to apply atomic energy to the needs of agriculture, medicine, and other peaceful activities, including the provision of abundant electrical energy in the power-starved areas of the world. Thus the contributing countries would be "dedicating some of their strength to serve the needs rather than the fears of mankind."

1954

Apr. 5: **Prime Minister Churchill makes public the provisions of the Churchill-Roosevelt atomic agreement of August 19, 1943, signed at Quebec.**

The agreement, which had not previously been revealed, pledged the two nations never to use the atomic bomb against each other or against third parties without the other's consent or to communicate any [A-bomb] information to third parties except by mutual consent. The British Government recognized "that any postwar advantages of an industrial or commercial character should be dealt with * * * on terms to be specified by the President of the United States to the Prime Minister of Great Britain." Finally a combined United States-British-Canadian "policy" committee was to agree on each country's work programs, allocate scarce materials, and settle disputes, with complete interchange of information.

Apr. 19: **U. N. Disarmament Commission rejects 9 to 1 (Lebanon and China abstaining) Soviet demands to include Communist China, India, and Czechoslovakia in the new series of atomic control talks.**

Apr. 26: **Premier Malenkov, in a speech to the Supreme Soviet in Moscow, states that the Soviet Union is ready for atomic war and that if it should come the final advantage would be on the Soviet side.**

May 2: **Prime Ministers of Burma, Ceylon, India, Indonesia, and Pakistan, at Colombo, join in a communique voicing support of the efforts of the U. N. Disarmament Commission to bring about the elimination and prohibition of hydrogen bombs and other weapons of mass destruction.**

1954

May 9: **Soviet Union states that it will not take part in the international atomic energy pool proposed by President Eisenhower unless there is a prior agreement to prohibit atomic weapons.**

May 13: **U. N. Disarmament Commission Subcommittee, consisting of Canada, France, the U. S. S. R., the United Kingdom, and the United States, meets in London until June 22.**

May 21: **French Delegate declares before the U. N. Disarmament Subcommittee: "I am convinced * * * that in the present state of development of atomic science the Baruch Plan as formulated in 1946 is today obsolete and would be ineffective * * *."**

May 25: **Secretary of State Dulles states that the sending of arms to Guatemala by international Communists endangers the peace of the Americas.**

June 1: **Soviet Union proposes that states "assume a solemn and unconditional obligation not to employ stomic, hydrogen, or other weapons of mass destruction."**

June 11: **France and the United Kingdom, with the support of the United States and Canada, propose a disarmament program which would prohibit the use of nuclear weapons except in defense against aggression, and would freeze all military expenditures and manpower at the December 1953 levels.**

A treaty was envisaged which would eventually provide for the prohibition of the manufacture and use of nuclear weapons, for the diversion of existing military stocks, and for the establishment of a control organ to supervise observance of the treaty. A detailed plan for the timing of the introduction of these reductions, prohibitions, and controls was presented.

The Soviet Union rejected the proposed French-British-sponsored program and submitted new proposals. These added to the previous Soviet position suggestions for an international control organ to "carry out" inspection on a continuing basis without the right to interfere in the domestic affairs of states. The Disarmament Subcommittee rejected the Soviet proposals.

June 22: **Members of the U. N. Disarmament Subcommittee conclude their meetings in London and begin drafting a report to the Commission on their failure to break the 8-year deadlock.**

June 29: **President Eisenhower and Prime Minister Churchill, in Washington, issue a joint declaration calling for reductions in armaments under effective safeguards and the use of nuclear power to enrich and not destroy mankind (the "Potomac Declaration").**

1954

July 21: **Indochina Truce is signed at Geneva.**

July 29: **U. N. Disarmament Commission unanimously agrees to submit for consideration India's proposal for an interim "standstill agreement" on nuclear explosions and full publicity of the extent of destructive power and known effects of these weapons.**

Disarmament Commission adjourns without reaching agreement.

Aug. 26: **Mutual Security Act of 1954 gives the President authority to control the traffic in arms and other strategic materials, including technical data relating thereto.**

Aug. 30: **President signs the Atomic Energy Act of 1954, revising the Act of 1946.**

The revision authorized the exchange with allies of tactical information essential to the development of defense plans and the exchange of data and material for the peaceful use of atomic energy.

Pursuant to this act there have been signed to date (March 15, 1956) agreements between the United States and 28 countries covering the peaceful uses of atomic energy. The following countries have signed agreements: Argentina, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, West Germany (agreement not yet in force), Greece, Israel, Italy, Japan, Korea, Lebanon, the Netherlands, Pakistan, Peru, the Philippines, Portugal, Spain, Sweden, Switzerland, Thailand, Turkey, United Kingdom, Uruguay, Venezuela.

Sept. 8: **Southeast Asia Collective Defense Treaty is signed at Manila by Australia, France, New Zealand, Pakistan, the Philippines, Thailand, the United Kingdom, and the United States.**

Sept. 30: **U. S. S. R. presents a new draft resolution on disarmament to the U. N. General Assembly based on the British-French proposals in London of June 11, 1954.**

Statements by United States, British, and French representatives at the time expressed the hope that the Soviet Union was yielding on points it had maintained throughout eight years.

Oct. 22: **The Soviet Union joins the Western Nations in sponsoring a resolution in the Subcommittee of the U. N. Disarmament Commission calling for a new attempt to achieve disarmament and the prohibition of nuclear weapons.**

1954

Oct. 23: **Protocols of the Western European Union Charter are signed, including provision for the control of armaments.**

The protocols were signed by Belgium, France, the Federal Republic of Germany (West Germany), Italy, Luxembourg, the Netherlands, and the United Kingdom. They made provision for a control agency to be established for the furnishing of information concerning the extent of armaments for each participating country, for the control of specific armaments (including atomic, biological, and chemical), various types of military weapons, missiles, warships, aircraft, and so forth, and the limitation of armed forces, as well as the contribution of them to the protection of the Western European Union.

Paris Protocol on the Termination of the Occupation in the Federal Republic of Germany is signed.

The protocol provided for the temporary retention of certain rights by the United States, the United Kingdom, and France relating to disarmament and demilitarization. A Joint Four-Power Commission was to retain the existing powers in these matters until the entry into force of the arrangements for the German defense contribution and the establishment of an agency for the control of armaments.

Nov. 4: **U. N. General Assembly calls for a new attempt to reach an East-West agreement on disarmament and the prohibition of nuclear weapons.**

By a unanimous resolution the Assembly adopted recommendations on further efforts to seek an acceptable solution of the disarmament problem by means of an international convention embodying the various proposals for reduction, prohibition, inspection, and international control.

1955

Feb. 25: **Five-Nation Disarmament Subcommittee (United States, Britain, Canada, France, and the Soviet Union) resumes meetings until May 18.**

Mar. 1: **Prime Minister Winston Churchill opens a House of Commons debate on thermonuclear weapons with approval of the policy of deterring war by maintaining armed strength, unless there can be trustworthy and universal agreement on disarmanent.**

He said that "the best defense would, of course be bona fide disarmament all around." We may now have reached, he said, "a stage * * * where safety will be the sturdy child of terror and survival the twin brother of annihilation."

1955

Mar. 8: **Canada, France, the United Kingdom, and the United States present a joint resolution in the Subcommittee of the U. N. Disarmament Commission calling for a treaty to prohibit use of atomic weapons except in defense against aggression.**

The resolution recommended that the treaty provide that "* * * all states possessing nuclear weapons should regard themselves as prohibited in accordance with the terms of the charter of the United Nations from the use of such weapons except in defense against aggression" pending the total prohibition of such weapons; further, that it provide (*a*) for total prohibition of nuclear weapons; (*b*) for a major reduction in armed forces and armaments, and (*c*) for the establishment of a control organ to guarantee observance of the above.

Mar. 18: **Soviet Union presents, in the U. N. Disarmament Commission Subcommittee, a plan for disarmament containing a provision prohibiting increase in armed forces or military appropriations beyond the level of January 1, 1955.**

In some respects the plan resembled one advanced jointly in the summer of 1954 by Britain and France. Its effect, however, would have been to prohibit the German Federal Republic from raising the 12 divisions projected as its contribution within the North Atlantic Treaty Organization to the defense of Western Europe.

Mar. 19: **President Eisenhower creates a post of Special Assistant on Disarmament.**

The White House announcement stated that Harold E. Stassen, the Special Assistant, was to "take into account the full implications of new weapons now in the possession of other nations, as well as the United States, to consider future probabilities of armaments, and to weigh the views of the military, the civilians, and the officials of our Government and of other Governments."

Apr. 13: **North Atlantic Treaty Organization Council issues text of draft agreement of March 2, 1955, for cooperation concerning atomic information among NATO members.**

Apr. 19: **France and the United Kingdom submit new proposals to the U. N. Disarmament Commission Subcommittee.**

They recommended that a draft disarmament treaty should include complete prohibition and elimination of nuclear weapons to start after 75 percent of reductions in conventional forces had been achieved.

1955

Apr. 24: **At Bandung Conference the final communique of Asian and African countries asserts that "* * * the problem of peace is correlative with the problem of international security."**

The communique urged all states to cooperate "especially through the United Nations in bringing about the reduction of armaments and the elimination of nuclear weapons under effective international control * * *."

May 10: **Soviet Union modifies disarmament proposals in the United Nations Disarmament Commission's Subcommittee.**

One new Soviet proposal called for an international control agency with inspectors chosen on an international basis, inspectors to establish "control posts in big ports, railway junctions, motor roads and airdromes." The Soviet Union also called for the dismantling of all foreign bases, a ban on nuclear weapons testing, and acceptance of the levels of a reduction of arms proposed by Western Powers.

May 14: **Eight Communist nations sign the Warsaw Pact, formalizing military ties in Eastern Europe.**

June 1: **Subcommittee of the U. N. Disarmament Commission meets in New York and decides to suspend disarmament talks pending forthcoming Big Four Meetings "at the Summit" in July.**

July 18: **President Eisenhower, Prime Minister Eden, Premier Bulganin, and Prime Minister Faure meet at Geneva.**

Premier Edgar Faure of France proposes that financial resources made available in the event of disarmament should be allocated to international expenditure for development and mutual assistance.

British Prime Minister Eden at Geneva suggests tentative plan for European security as a preliminary step to larger plan within the United Nations.

His proposal was for (1) a mutual security pact within the United Nations among France, the United Kingdom, the United States, and the Soviet Union, plus a united Germany; (2) agreement on the armaments of Germany and neighboring countries under reciprocal supervision of all the countries involved; and (3) a demilitarized area between East and West.

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1955

July 21: **President Eisenhower presents a proposal calling for an exchange of blueprints of military information between the United States and the U. S. S. R., to be verified by mutual aerial reconnaissance as a "beginning" for a comprehensive and effective system of inspection and disarmament.**

In making this proposal the President said: "We have not as yet been able to discover any scientific or other inspection method which would make certain of the elimination of the nuclear weapons."

Soviet Premier Bulganin offers abbreviated version of the Soviet disarmament proposals submitted to the United Nations Disarmament Commission's Five-Nation Subcommittee in London on May 10, 1955.

United States, United Kingdom, France, and the U. S. S. R., at "Summit Conference," recommend that the U. N. Disarmament Commission Subcommittee resume meetings in New York August 29.

July 25: **United States Senate approves Senate Resolution 93 (84th Cong., 1st session) calling for the creation of a Subcommittee of the Foreign Relations Committee to "study proposals (for) disarmament and the control of weapons of mass destruction."**

The subcommittee was to be composed of 12 members, equally divided between the parties, consisting of 6 members of the Committee on Foreign Relations, 4 members of the Committee on Armed Services, and 2 members of the Joint Committee on Atomic Energy.

July 28: **Senate passes resolution (S. Res. 71, 84th Cong.) requesting the President to "present to the United Nations a proposal to explore the possibilities of limiting the proportion of every nation's resources devoted to military purposes" so as to increase the proportion devoted to raising living standards.**

Aug. 29: **United States gives details of President Eisenhower's inspection plan at resumption of meetings of the Disarmament Commission's Subcommittee.**

Sept. 1: **In the U. N. Disarmament Commission, Soviet delegate calls on the West to accept the "major point" of the Soviet disarmament plan and thus to improve the atmosphere for consideration of "other questions."**

The principal Soviet proposals were: armed forces of United States, Soviet Union, and Communist China to be cut to 1 to 1½ million men, with lower levels for other countries; a ban on the use of nuclear weapons when these cuts had been 75 percent completed; a total ban on and the destruction of atom bombs when the remaining 25 per cent had been cut; a Western promise to use atomic weapons in the interim only in cases defined as aggression by the U. N. Security Council; an immediate end to atomic tests.

1955

Sept. 13: **British plan to test a joint reporting and inspection system in selected areas of Europe is presented to U. N. Disarmament Commission Subcommittee.**

Sept. 19: **Soviet Premier Bulganin in a letter to President Eisenhower states that "in principle we have no objections" to the Eisenhower plan for an exchange of military blueprints and mutual inspection of arms installations.**

He added, however, that "to avoid misunderstandings, it is self-evident that information on all kinds of armaments, conventional as well as nuclear, must be submitted," and that exchange and inspection "would become significant only if agreement is achieved on the reduction of armaments and on taking measures for the prohibition of atomic weapons."

Sept. 23: **Molotov tells the U. N. General Assembly that the U. S. S. R. is still studying the Eisenhower plan, which "was an expression of a sincere desire" to make progress toward disarmament.**

Oct. 7: **U. N. Disarmament Commission's Subcommittee recesses in view of the approaching meeting of the "Big Four" Prime Ministers in Geneva.**

At the final meeting of the Subcommittee the Soviet delegate repeated the Soviet view that President Eisenhower's inspection plan would not be acceptable except as a part of a general disarmament program. The United States representative expressed satisfaction over "a real improvement in the climate of discussion and the exchange of views on facts as they exist in the world." The Subcommittee unanimously approved its report and submitted it to the Disarmament Commission.

Oct. 11: **In reply to Bulganin's letter of September 19, President Eisenhower offers to accept the U. S. S. R. plan for ground-inspection teams at key military concentration points in the United States and U. S. S. R., if U. S. S. R. accepts his plan for exchanging military blueprints and aerial reconnaissance rights.**

Oct. 27: **Foreign Ministers of the United States, United Kingdom, France, and the U. S. S. R. convene at Geneva.**

The directive of the heads of government in July had instructed them to consider, among other things, the control and inspection of arms. The Ministers debated Western proposals for German unification coupled with a security guaranty for Eastern Europe and Mr. Molotov's proposal for an all Europe security pact. Mr. Molotov's proposal was criticized as failing to carry out the directive of the heads of government at the Geneva meeting in July. The talks ended on November 16 without any agreement.

1955

Nov. 23: **U. N. Disarmament Commission meets and transmits to the General Assembly and the Security Council the report of its Subcommittee.**

The report presented the positions of the "Powers principally involved," which had been advanced during the year as well as proposals submitted to the "Summit meetings" of July in Geneva.

The French delegate suggests that the disarmament plans already put forward by France, the United Kingdom, and the United States on the one hand, and the U. S. S. R. on the other, be combined.

The French delegate to the U. N. Disarmament Commission set forth the following principles: no control without disarmament; no disarmament without control; but progressively all disarmament that can be controlled; atomic stockpiles should be renounced and tests be made for peaceful purposes only; scientific conferences should be held periodically, "to pinpoint the search for methods of detecting the stocks with a view to destroying them as soon as the method has been discovered."

Dec. 3: **U. N. General Assembly adopts unanimously a resolution to establish an International Committee on Peaceful Uses of Atomic Energy.**

U. N. General Assembly unanimously votes to establish a 15-member scientific committee to collect, evaluate, and disseminate information on the effects of atomic radiation.

Dec. 14: **In India, officials of the U. S. S. R. announce that their country will continue to make atomic and hydrogen bombs.**

Dec. 16: **U. N. General Assembly approves resolution on disarmament which gave priority to President Eisenhower's plan for exchanging military blueprints and mutual aerial inspection, plus the Soviet plan for ground control posts, and also to "all such measures of adequately safeguarded disarmament as are now feasible."**

Dec. 24: **Pope Pius XII, in his annual Christmas message, gives his support to proposals for international disarmament.**

The Pope's three-point program—assuming that adequate safeguards could be achieved—called for: (1) renunciation of experimentation with nuclear weapons; (2) abandonment of the use of nuclear weapons; and (3) control of armaments in general.

1956

Jan. 23: **U. N. Disarmament Commission agrees that its Subcommittee should resume work in the near future.**

In letter to President Eisenhower, Premier Bulganin proposes a treaty of friendship and cooperation between the Soviet Union and the United States.

On January 26 President Eisenhower replied that this "might indeed work against the cause of peace by creating the illusion that a stroke of a pen had achieved a result which in fact can be obtained only by a change of spirit."

Jan. 28: **Representatives of the Warsaw Treaty Powers (see May 14, 1955), meeting in Prague, issue statement on the armament race.**

They voiced confidence in securing peace by replacing military alinements with collective security arrangements and proposed a ban on nuclear weapons for forces of all parties on German territory (both East and West Germany).

Feb. 1: **"Declaration of Washington" issued jointly by President Eisenhower and Prime Minister Eden reaffirms objective of universal and effectively controlled disarmament.**

Mar. 6: **United States makes public President Eisenhower's letter of March 1 to Premier Bulganin of the U. S. S. R.**

It read in part:

"In my judgment, our efforts must be directed especially to bringing under control the nuclear threat. As an important step for this purpose, and assuming the satisfactory operation of our air and ground inspection system, the United States would be prepared to work out with other nations suitable and safeguarded arrangements so that future production of fissionable materials anywhere in the world would no longer be used to increase the stockpiles of explosive weapons."

Mar. 19: **Subcommittee of U. N. Disarmament Commission resumes work in London.**

A DECADE OF NEGOTIATIONS

1946–1956

STAFF STUDY NO. 3

JULY 22, 1956

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PREFACE

By Senator Hubert H. Humphrey, Chairman

At the present time three nations are known to possess nuclear weapons, the United States, the Soviet Union, and the United Kingdom. In the not too distant future other countries are likely to have them. As the stockpiles grow, the shadow of destruction lengthens over the entire human race. Scientific knowledge is now available and, to a considerable extent, so are the weapons, to turn the earth into an empty desert. This is not fantasy, nor is it a prospect about which only future generations need be concerned. The danger of sudden nuclear extinction confronts us. The possibility of the suicide of civilization exists now.

Since the end of World War II, the United States and other nations have sought means to prevent this catastrophe. Proposals have been made to control and eliminate nuclear weapons. These proposals are part of the overall efforts directed toward the control and reduction of all armaments and of the prevention of war itself.

The negotiations to transform the proposals into international agreement have been extensive. Yet, after a decade of negotiations, agreement has not been reached. Let us hope that the period of futile agreement to disagree is now on the wane. Certainly, however, the Soviet Union has resorted in the past to the shadowboxing tactics of seeking acceptance of its proposals only to raise new obstacles when the possibility of success was close. We will have to be alert to be sure their attitude during recent disarmament negotiations is not suddenly reversed by some new tack or diversion.

Of late, there have been indications of changing attitudes and policies which give reason for cautious hope. It may be that a common awareness of the devastating implications of nuclear war is growing in all the principal nations and is impelling them toward agreement. That remains to be seen. In the meantime the nuclear race is being superseded by a new and more deadly contest, the race to develop the long-range ballistic missiles to deliver nuclear destruction. We may be on the verge of a new type of warfare, warfare waged by weapons thrust beyond the earth's atmosphere in flights of devastation between the continents.

This nation has stressed over and over again the urgent necessity of agreement on inspection and control among the principal nations to prevent this nightmare of sudden destruction by surprise attack. The Soviet Union still hesitates while time runs out. If agreement is not reached before the perfection of the long-range missile, the so-called ICBM, this generation may well lose the last chance to provide a reasonable measure of security for all nations through safeguarded disarmament.

Staff Study No. 3, Control and Reduction of Armaments, A Decade of Negotiations, 1946–56, is an analysis of the proposals advanced by the negotiating powers since 1946, the efforts to reconcile the proposals, and the problems which have been encountered in the process. It was prepared by Ellen Collier and Dan Jacobs of the subcommittee staff with the assistance of Mary Fulton of the Legislative Reference Service, Library of Congress. It does not necessarily reflect the views of the subcommittee or any of its members.

JULY 22, 1956.

CONTROL AND REDUCTION OF ARMAMENTS

A DECADE OF NEGOTIATIONS

1946–1956

A. Introduction

The advent of nuclear weapons introduced an entirely new element into the historic problem of control of armaments. Of theoretically unlimited destructive power, these revolutionary weapons raised in acute form the possibility of the destruction of civilization. As the President has noted, science has brought the world to a point

> where war does not present the possibility of victory or defeat . . . only the alternative in degrees of destruction.[1]

This knowledge has made the control of nuclear weapons the main concern of disarmament negotiations in the postwar decade. Shortly after the end of World War II, the United States expressed the view in the United Nations that control of atomic energy was the key to the whole problem of disarmament. Until there was progress in this field, this country contended, there could be no success in the general area of the regulation of armaments.[2] United States policy down to the present has been dominated, in general, by the view that the fundamental problem of disarmament is control of nuclear weapons under an effective system of inspection.

The Soviet position on disarmament has also recognized the central importance of nuclear weapons in disarmament negotiations, but in a different vein. All during the postwar period, as they were attempting to overtake the technological superiority of the United States in this field, the Russians sought the total prohibition of the manufacture, stockpiling and use of atomic weapons. They apparently modified their position in this regard for the first time at the London conference in the spring of 1956, when they dropped this point from their proposals. It is probably not without significance that the change coincided with Soviet claims of having equalled or surpassed the United States in nuclear weapons development.

Until the recent shift, Soviet policy was tied closely to an attempt to label the United States and other major Western powers as "warmongers" and "aggressors." Communist propaganda used the deceptively simple theme "ban the bomb" to place the burden of blame for the threat of war on the United States.

The United States has held that the slogan "ban the bomb" has no meaning—or poses an even greater threat of war—unless effective means are first provided for insuring that the continued production and stockpiling of nuclear weapons have ceased. In the earlier

[1] Speech at Trinity College Convocation, Hartford, Conn., New York Times, October 21, 1954, p. 1.
[2] Yearbook of the United Nations, 1946–47, p. 376.

stages, therefore, our policy concentrated on establishing an effective international system of inspection and control of the production and use of atomic materials as the first step toward disarmament. This early approach is now regarded, not only by this country but by others, as no longer entirely adequate to control nuclear weapons. Nations have had several years to produce nuclear weapons and at least three have a supply of such weapons. There is no effective method known of detecting these stockpiles. What this means is that even if production of nuclear weapons were brought under control, there would be no assurance that a devastating supply of such weapons already produced could not be hidden for use in the event of war. In consequence, United States policy has been broadened to include inspection of the means of employing nuclear weapons in a sudden surprise attack.

While concern with nuclear weapons has been paramount, international negotiations during the past decade have also proceeded on the limitation and control of conventional armaments. All sides have advanced proposals in the latter connection.

The effort to limit and control armaments has gone on within the framework of the United Nations. Under the charter that organization was assigned certain responsibilities in connection with the negotiations of disarmament agreements. The General Assembly was expected to develop principles to govern disarmament and the regulation of armaments (art. 11). To the Security Council was given the task of formulating plans for an actual regulatory system (art. 26).

The disarmament proposals which have provided the basis for most of the discussion during the past decade have been advanced by the United States, the Soviet Union, the United Kingdom and France. In recent years, Canada has also played an important part in the negotiations largely because of its knowledge of the production of atomic energy.

The proposals advanced by the major powers at various times and the difficulties in their reconciliation are a part of the general unfolding of world events. Failures to reach agreement on disarmament are perhaps inextricably interwoven with other international questions. This study, however, concentrates on the disarmament proposals of the principal powers, as they have evolved over the decade since the close of World War II. Where necessary, the intent of a proposal or the underlying reason for its failure of acceptance is described in the wider context of the implications it has held for the negotiating powers. But there is no attempt to relate negotiations directly to the whole fabric of international developments from 1946 to the present. The focus of the study is negotiations on disarmament.

These negotiations are readily divisible into three periods. During most of the period 1946 to 1950 the United States alone possessed atomic weapons. While the United States at that time advanced a plan for international control not only of such weapons, but of the entire field of atomic energy, the Soviet Union concentrated on efforts to "ban the bomb."

From 1950 till 1955 the Western Powers enlarged their approach beyond control of atomic weapons to consider jointly the problem of limitation of conventional weapons and armed manpower, a problem which the U.S.S.R. had insisted should become a part of disarmamemt discussions.

The period from May 10, 1955, to the present has been marked by intense efforts in the field of disarmament negotiations. Both sides have altered their positions in some degree. These changes come at a time when there is a general shifting of emphasis in Soviet foreign policy and tendencies in other countries to reduce the effort and expenditures devoted to military measures.

B. The Period 1946–50

At the outset of postwar negotiations the United States and the Soviet Union made the principal proposals on disarmament. Other nations have made recommendations from time to time. In general, however, the main lines of discussion were set by the United States and the U. S. S. R. and for nearly a decade neither nation departed appreciably from its initial position. The view of the United States for the most part was endorsed repeatedly by a great preponderance of the other nations of the world. The Soviet position drew consistent support only from Communist states.

Underlying the negotiations during most of this period was the fact that the United States alone held atomic weapons, while the Soviet bloc possessed a preponderance of strength in armed manpower over the western powers growing out of the rapid demobilization of the latter after World War II. In the circumstances, the Soviet Union called repeatedly for prohibition of the production and use of atomic weapons, while refusing to accept international control and inspection over atomic power which were at the heart of the United States proposals. The United States and other western nations found the Soviet proposals on conventional armaments unacceptable both in the form in which they were advanced and because the U. S. S. R. insisted that limitation of conventional weapons be linked to an absolute prohibition of atomic weapons but without provision for adequate international inspection.

Discussion and debate of the conflicting points of view took place mainly in two commissions of the United Nations. Of these, the first to be established was the United Nations Atomic Energy Commission. The Soviet Union, France, and China joined Britain, Canada, and the United States in sponsoring the establishing resolution which was adopted unanimously by the United Nations General Assembly on January 24, 1946. The Commission was directed to study methods to control the newly devised atomic weapons and to promote the peaceful use of atomic energy.

The following year, the United Nations Security Council established a Commission for Conventional Armaments. This Commission was directed to deal with questions of limitation of forces and armaments, which did not come within the purview of the United Nations Atomic Energy Commission. While the Soviet Union had been insistent on the need for limitation of conventional weapons, it abstained from voting for the resolution to establish the Commission because of objections to the exclusion of atomic energy matters from its jurisdiction.

Negotiations during the period 1946–50 were pursued against a background of deteriorating relations between the Soviet Union and the western nations. As the world political situation grew worse, national positions on disarmament tended to harden. The general

international atmosphere became increasingly hostile to the reconciliation of differences. The same proposals on armaments control were advanced again and again by both sides and rejected repeatedly and with increasing acrimony by both sides.

During this period the conventional armed forces of the United States and other western nations were maintained at a very low level as compared with those of the Soviet bloc. The offset to greater Soviet superiority in this category rested in the United States possession of atomic weapons. As the Soviet Union grappled with the scientific problem of producing the atomic bomb, the United States led an attempt to restore other sources of strength in the Western World. There followed in quick succession aid to Greece and Turkey, the Marshall plan and the North Atlantic Treaty, all of which were aimed in part at strengthening the defense of independent nations against possible aggression.

While these developments were taking place, session after session of the Atomic Energy Commission and the Commission for Conventional Armaments was consumed with repetition and rejection of the same proposals. The reiteration undoubtedly helped to clarify the positions and the sessions undoubtedly had an impact on world public opinion, at least initially. Beyond this, however, little progress was made, in the sense of the nations involved moving toward agreement on control of weapons.

1. NEGOTIATIONS ON CONTROL OF ATOMIC ENERGY

The United States position: The Baruch plan

At the first meeting of the United Nations Atomic Energy Commission in June 1946, the United States proposed what became known as the Baruch plan. The proposal called for the setting up of an international authority within the framework of the Security Council to own, control, or license all atomic fuel facilities from mine to finished product. As proposed, the international authority would have conducted continuous inspection of all phases of the production of fissionable materials. It would also have had the exclusive right to conduct atomic weapons tests and to carry on research in atomic weapons. Finally, it would have been charged with the task of promoting peaceful international uses of atomic energy.

The Baruch plan meant, in effect, a shift from national to international control, not only of atomic weapons but of all the principal aspects of development of atomic energy. The actual transition from national to international control, however, was not to take place immediately. It was to be phased, that is, to proceed step-by-step over an indeterminate period of time.

The Baruch plan provided ultimately that—

> When an adequate system for control of atomic energy, including the renunciation of the bomb as a weapon, has been agreed upon and put into effective operation and condign punishments set up for violations of the rules of control,[3]

the national manufacture of atomic bombs would cease and all existing bomb stockpiles be destroyed. An essential feature of the plan was that once established, international control of atomic energy

[3] U. S. Congress. Senate Committee on Foreign Relations, Subcommittee on Disarmament: A Collection of Documents, 1919-55. 84th Cong., 2d sess. Washington, U. S. Government Printing Office, 1956, p. 192. Hereinafter referred to as Collection of Documents.

including the application of sanctions for violation was not to be subject to the veto of any single power.[4]

In 1948, the United Nations General Assembly, with only the Soviet bloc voting in the negative, approved proposals of the Atomic Energy Commission which in effect endorsed the Baruch plan. A year later the General Assembly recommended that all nations join in mutual agreement to limit the individual exercise of their sovereign rights in the control of atomic energy "to the extent required * * * for the promotion of world security and peace." [5] The recommendation in substance lent further support to the Baruch plan to which the Soviet Union was by this time unalterably opposed. It meant also that the United States and 48 other countries had endorsed in principle a far-reaching course of action involving, if adopted, an extensive measure of international control over the development of atomic energy.

Soviet proposal for the control of atomic energy

The Soviet Union, which in 1946 had not yet developed atomic explosives, insisted on a sharply different approach to the problem. In June of that year it advanced proposals which called for a multilateral treaty prohibiting atomic weapons "in any circumstances whatsoever," and the destruction of all existing stocks of such weapons. Thereafter, under the Soviet plan, steps were to be taken to provide some type of international control machinery and periodic international inspection of the production of atomic materials in each nation. Atomic energy was to continue to be developed exclusively by the individual states and not primarily by an international authority such as the Baruch plan had envisaged. The power of punishment for violations similarly was to reside in each nation itself. Moreover, such international authority as provided for in the Soviet plan was to come under the jurisdiction of the Security Council where the veto power would be operative.

The Soviet Union sought to advance its position on control of atomic weapons, not only in the United Nations, but by worldwide propaganda campaigns. In 1950, for example, the Communists launched the "Stockholm peace appeal." This campaign consisted of the circulation of petitions for signatures in virtually every nation in the world, calling for the unconditional abolition of atomic weapons and the branding of any government which first used such weapons against another as guilty of war crimes against humanity.[6] A few months after the "Stockholm peace appeal" was launched and while it was still in progress, the North Korean Communists began a military attack on South Korea with conventional weapons.

2. CONTROL OF CONVENTIONAL ARMAMENTS

Soviet proposals

In November 1946 the U. S. S. R. opened the question of control of conventional armaments. It advocated in the United Nations the reporting by member states of information on armed forces which they maintained in foreign countries. This proposal was coupled with

[4] Collection of Documents, p. 189.
[5] U. N. General Assembly. Official records of 4th session. Resolutions, September 20–December 10, 1949. Lake Success, N. Y. A/1251, p. 22.
[6] New York Times, March 30, 1950.

a general demand for a reduction of armaments and the prohibition of the production of atomic energy for military purposes.[7]

In the situation which existed at that time, the Soviet proposals had the effect of providing both military and psychological advantages for the Communist nations. They permitted the U. S. S. R. to capitalize on the worldwide popular reaction to the sacrifices of World War II. At the same time, if adopted, they would have permitted an improvement in the Soviet military position, by exerting pressure on the United States and Great Britain to hasten the withdrawal of their forces which still remained overseas in the aftermath of that conflict.

The Western position

While various points of view developed in the debate on the Soviet proposals, an area of agreement grew up around the broad principles of disarmament. A resolution was adopted by unanimous vote of the General Assembly late in 1946. It recognized the necessity for early general regulation and reduction of armaments and armed forces.[8]

The following year the Security Council established the Commission for Conventional Armaments. At the insistence of the United States, its jurisdiction was restricted to nonatomic weapons. From the outset, attitudes proved as irreconcilable as those which had characterized the discussions of atomic energy. The United States position, which was shared by the United Kingdom and others, held that control and reduction of conventional armaments would be brought about only under conditions of international confidence and security. The two countries, for example, urged prompt action to provide armed forces under the Security Council, in accord with article 43. They asked also for international control of atomic energy, and the arrangement of a peace settlement with respect to Germany and Japan.

Soviet proposal for one-third reduction

The Soviet Union, on the other hand, insisted that a reduction in armaments would in itself help to create an international climate conducive to peaceful relations.[9] In 1948, it proposed a one-third reduction in the land, naval, and air forces of the permanent members of the Security Council[10] which was tied, however, to a demand for an unconditional banning of all atomic weapons. This twofold proposal was made repeatedly in subsequent discussions. The Soviet Union insisted that the question of atomic weapons was so closely related to the reduction of conventional armaments that the two problems could not be considered separately.

The proposal for a flat one-third reduction in armaments and armed forces coupled with a ban on atomic weapons was unacceptable to the western powers. These nations not only challenged the sincerity of the proposal but continued to insist that conditions of international confidence had to be established before reductions in conventional weapons could begin.

The question of verification also entered into their considerations. Unlike the western powers, the Soviet Union had never officially revealed the actual size of its armed forces. On each occasion that the

[7] Goodrich and Simons. The United Nations and the Maintenance of International Peace and Security (Washington, 1955), pp. 542–543.
[8] Collection of Documents, p. 82.
[9] Yearbook of the United Nations, 1947–48, p. 478.
[10] United States, United Kingdom, France, China, and the Soviet Union.

"one-third reduction" proposal was introduced in the U. N. Security Council and the General Assembly, it was rejected by the majority of the member states in part because of its failure to provide an effective verification system.

French proposal for a census of armed forces and armaments

As a preliminary step, France advanced in 1949 a plan for the collection, verification, and publication of information on existing armaments and armed forces. The plan provided for an international control organ and it detailed methods for collecting and verifying data.

Although approved by both the Commission and the General Assembly, the French proposal was opposed by the Communist bloc and vetoed by the Soviet Union in the Security Council.[11] The Soviet representatives denounced the plan on the grounds that it did not include atomic weapons and further because it provided for the collection of information on armaments instead of considering their reduction. What was not mentioned, however, was that in the Soviet Union the net of secrecy was much tighter than in the West. An arms census would have had the effect of bringing to light information which, for whatever reason, the U. S. S. R. was more anxious and able to conceal than the western nations. Yet, without such information, the "one-third cut" proposal lost much of its significance, especially in the atmosphere of international tension and mistrust which existed when it was made.

C. The Period 1950–55

Disarmament proposals during the years 1950–55 were marked by growing flexibility. A modified United States approach was set forth by the President in a speech to the United Nations General Assembly in October 1950.[12] In his address he indicated a willingness to consider together two problems which the United States had previously held to be separate, that of control of atomic weapons and that of regulation of conventional weapons. This offer led to the establishment in 1952 of a single United Nations Disarmament Commission to replace the separate Commissions for Conventional Armaments and Atomic Energy.

Even before the President made his proposal, however, conflict had broken out in Korea. It created an atmosphere in which disarmament negotiations had little relation to reality. The aggression against South Korea shocked the western nations into rapid acceleration of the rebuilding of their conventional armed strength to counterbalance the Soviet and Communist Chinese forces. The pressure for this restoration intensified especially when it became clear that atomic weapons were not going to be employed in the Korean war.

While the western nations strengthened their conventional forces, the Soviet Union pushed its efforts to close the gap in nuclear weapons development and both sides entered into a race for even more destructive weapons. In 1952 the United States produced a thermonuclear weapon, the hydrogen bomb, followed the next year by Soviet production of the same.

[11] The Soviet representatives had themselves in 1946 proposed that nations should submit information regarding all their armed forces and armaments but without verification.

[12] Collection of Documents, p. 985.

Some observers theorized that the new nuclear weapons, far more powerful than their predecessors, produced a "balance of power," or more properly a "balance of terror" based upon a mutual capacity to wreak overwhelming devastation. It is conceivable such a balance, among other factors, gave rise to the succession of events which began in 1952 with the Korean truce. These events had the cumulative effect of reducing military tensions throughout the world, at least for the moment, and were accompanied by intensified negotiations on disarmament.

1. JOINT CONSIDERATION OF NUCLEAR AND CONVENTIONAL WEAPONS

Western proposals

In November 1951, the United States, the United Kingdom, and France presented a tripartite proposal to the General Assembly. It called for a census of all military forces and armaments, including atomic weapons, and ceilings on armed forces and arms output. This proposed program, which was to be verified by "effective international inspection," was made contingent in effect on adoption of the Baruch plan and a general political settlement, including a Korean truce.[13]

Although rejected by the Soviet Union, a byproduct of the western proposal was the merging of the Atomic Energy Commission and the Commission for Conventional Armaments into a single United Nations Disarmament Commission.[14] The new Commission met in March 1952 and began discussions on the basis of a French plan which was designed essentially to reconcile the positions of the United States and the Soviet Union. It provided for the simultaneous consideration of the regulation of all armaments and the problems of disclosure and verification.

In April 1952, the United States submitted a proposal on the question of disclosure and verification.[15] Set forth was a plan of procedure divided into 5 stages, proceeding from disclosure and verification of the less secret to the most secret weapons, over a minimum period of 2 years. It involved the disclosure of (1) overall manpower strength and the location of military (including atomic) installations and facilities; (2) details of organization of armed forces and installations and of armaments and atomic energy producing facilities; (3) details of all except novel armaments and of stockpiles of fissionable materials and production facilities; (4) details of facilities for producing novel armaments, and (5) details of novel armaments on hand. Aerial surveys were proposed as part of the machinery to verify the adequacy of disclosure in each stage.

This proposal was rejected by the Soviet Union on the grounds that it did not offer any actual reduction of armaments. The United States, in turn, proposed that the Disarmament Commission establish basic principles to guide deliberations on actual reductions. This country suggested "Essential Principles for a Disarmament Program" in an effort to make clear that the goal of disarmament was not to regulate but to prevent war by relaxing the tensions created by armaments and making war inherently impossible as a means of settling disputes. The ultimate objective, it was proposed, should

[13] Yearbook of the United Nations, 1951, p. 161.
[14] The Disarmament Commission is composed of all the members of the Security Council, plus Canada.
[15] Collection of Documents, p. 318.

be "an open world" substantially disarmed, in which states would not be adequately prepared to start a war and any preparation for war would be detected long before an attack would be launched.[16]

Further suggestions were presented jointly by the United States, France, and the United Kingdom on May 28, 1952. In a tripartite working proposal, they suggested, for illustrative purposes, numerical ceilings on armed forces—between 1 million and 1,500,000 for the armed forces of the Soviet Union, China, and the United States, between 700,000 and 800,000 for the United Kingdom and France, and normally less than 1 percent of population for other countries.[17] The following month France proposed a general plan for synchronizing progressive disclosure and verification of armed forces and armaments with parallel stages for actual reduction.

Again, the Soviet response was negative. Ignoring the fact that it had been specified in the western proposals that they were to be regarded as only one component of a comprehensive plan of disarmament, the Soviet spokesmen dismissed these proposals as dealing only with the problem of overall armed forces, for failing to consider allocation of manpower strength among the various branches—army, navy, and air—and for not including armaments along with manpower reductions. Subsequent efforts by the western powers to refine the proposals along these lines, however, were also rejected by the Soviet Union.

Soviet position

The Soviet Union's often-repeated demand for a one-third percentage reduction in conventional armaments and the prohibition of atomic weapons was brought forward again when the Disarmament Commission met in 1952. At that time it was linked with a new proposal which appeared to move in the direction of the western position. Under the new approach, strict international control of atomic energy was to be instituted simultaneously with a ban on atomic weapons. However, the Soviet Union could not be brought to elaborate on the details of this proposal.[18] Further doubt was cast on the sincerity of the proposal since it came at a time when the Russians were using the Disarmament Commission as a forum in an attempt to convince the world that the United Nations forces in Korea were employing bacteriological warfare.

The western powers contended that the Soviet plan would actually result in an undependable prohibition of nuclear weapons in view of the lengthy process involved in setting up a control system. The one-third reduction of conventional armaments was also rejected, as it had been previously, on the grounds that it would preserve the existing imbalance in armed forces which favored the Soviet Union.

In reply the U. S. S. R. argued that insistence on control measures as a prerequisite to disarmament would give the western powers access to information about the Soviet Union before any actual arms limitation or reduction took place. Further, the Soviet Union held that western proposals for numerical ceilings on armed forces did not take into consideration military bases or military alliances, such as NATO.

[16] Collection of Documents, p. 86.
[17] Collection of Documents, p. 287.
[18] Great Britain, Central Office of Information. The Disarmament Question, 1945–54., London 1954. Pp. 9–13.

United States proposal for an international control organ

In November 1953 the U. N. General Assembly established a subcommittee of France, Canada, the Soviet Union, the United Kingdom, and the United States to negotiate in private a disarmament formula. Implicit in this action was the belief that discussion of disarmament in the United Nations had become so enmeshed with the seeking of propaganda advantage that it hindered the achievement of agreement.

At the London meeting of the United Nations Subcommittee on Disarmament in May 1954, the United States introduced a proposal for an international control organ [19] which marked a major departure from the Baruch plan of 1946. While the latter had called for international ownership of fissionable material the new proposal omitted all reference to this point. Moreover, it called for only limited international management of atomic energy resources,[20] whereas the Baruch plan would have given this power largely to an international control authority.

Under the 1954 proposal the international nuclear control organ would have had its authority and power defined in a disarmament treaty. It would have been empowered to control atomic energy only to the extent necessary to insure prohibition of nuclear weapons and use of nuclear materials exclusively for peaceful purposes. It would have determined the methods of enforcing reductions in armaments, and of conducting unlimited inspections, including aerial surveys. It would also have been empowered to take emergency action upon the discovery of any violation of agreed upon regulations. The Soviet Union rejected the proposal on the grounds that the international control organ could be empowered to interfere with the internal affairs of individual nations.

2. "ATOMS FOR PEACE" PROPOSAL

The stalemate in disarmament negotiations despite rapid developments in nuclear weapons prompted the President of the United States to address the United Nations General Assembly on December 8, 1953. In this address he appealed to all nations to cooperate in finding ways to control the tremendous power of nuclear energy. The President also suggested that a start be made on peaceful use of the atom under international sponsorship and to that end—

> the governments principally involved, to the extent permitted by elementary prudence, * * * begin now and continue to make joint contributions from their stockpiles of uranium and fissionable materials to an International Atomic Energy Agency, * * * set up under the aegis of the United Nations.[21]

The President expressed the belief that his proposal might at least—

> initiate a new approach to the many difficult problems that must be solved in both public and private conversations if the world is to shake off the inertia imposed by fear and is to make positive progress toward peace.[22]

In the midst of general approval of the President's proposal, the Soviet Union contended that diverting a small part of atomic materials to peaceful uses while allowing production of atomic weapons to continue unrestricted would "play into the hands of aggressive

[19] Collection of Documents, p. 325.
[20] Collection of Documents, p. 329.
[21] Collection of Documents, p. 1000.
[22] Collection of Documents, p. 1001.

forces." The Soviet Union indicated it would take part in the talks on peaceful uses as proposed, but did not alter substantially the position it had maintained in years of deadlocked debate.[23]

3. ANGLO-FRENCH MEMORANDUM OF JUNE 11, 1954

In June 1954 international attention respecting disarmament shifted to a joint Anglo-French proposal. What was called for was a phased disarmament program providing at the outset for the constituting and positioning of an international control organ. This step was to be followed by first a limitation on armed forces and expenditures, then reductions of armed forces and conventional armaments and finally, prohibitions respecting nuclear weapons.

In summing up the British-French position, the Minister of State for the United Kingdom, said:

> First, our concept includes specific provision for the total prohibition of nuclear weapons, and secondly * * * that conventional armaments and nuclear weapons shall be dealt with together. Thirdly, when [the proposed] treaty comes into effect, those who have ratified it are committed from that moment to a process which ends and is bound to end in comprehensive disarmament. Fourthly, we have made it abundantly clear that disarmament and not just disclosure and verification is our essential objective.[24]

In September 1954 the Soviet Government announced that it would accept the joint Anglo-French plan of June 1954 for a "phased" disarmament program as a basis for discussion. It suggested, however, modification in the timing, reiterated earlier proposals for an immediate "one-third reduction" and opposed the establishment of a control organ before disarmament actually began. Subsequent discussion in the United Nations Disarmament Subcommittee early in 1955 developed compromise suggestions for reconciling the Anglo-French and Soviet positions on the timing of control measures and on the powers and functions of the international control organ.

The Anglo-French proposals were revised further and presented in March 1955 as a common position in which Canada and the United States concurred.[25]

D. The Period May 10, 1955–56

By the spring of 1955, it was clear that a change had appeared in Soviet tactics under the general slogan of "peaceful coexistence." This change brought with it a significant alteration in the Russian position on disarmament. New proposals were put forward on May 10, 1955, the day after West Germany was brought into full membership in the North Atlantic Treaty Organization.

The change in the Soviet position also coincided with an important technical consideration which entered into disarmament negotiations in this period. For the first time there was general recognition that no method of inspection known to science could detect with any degree of certainty the existence of stockpiled nuclear weapons.

This fact influenced United States policies on disarmament. We had previously held to the principle of the elimination of nuclear weapons on the basis of fool-proof inspection. It was a position,

[23] Great Britain, Central Office of Information. op. cit., p. 312.
[24] Remarks in a House of Commons debate on July 31, 1954. Great Britain, Central Office of Information. op. cit., p. 52.
[25] Collection of Documents, pp. 334–335.

however, which was no longer tenable since science could not detect the existence of nuclear weapons already manufactured and the Soviet Union had begun stockpiling them, presumably in 1949.

In March 1955, the United States undertook a reappraisal of its disarmament policies. Subsequently the President proposed his "open skies" plan of aerial inspection and exchange of military blueprints and in September 1955 the United States placed reservations on all its previous proposals.

During the London meetings of the United Nations Subcommittee on Disarmament in the spring of 1956, the Soviet Union departed from its long-standing insistence on absolute prohibition of nuclear weapons. The United States as well as Britain and France advanced new proposals which took into consideration those of the Soviet Union. While no agreement was reached, the meetings were carried on with less vituperation than had previously been the case and the President's Special Assistant on Disarmament reported that progress had been made.

1. SOVIET PROPOSALS, MAY 10, 1955

The new Soviet approach to disarmament was set forth on May 10, 1955. The Soviet Union accepted the western position on the timing of complete prohibition of atomic weapons in relation to reduction of conventional armaments. Abandoning the argument for a one-third cut in conventional armaments and armed forces, the Russians endorsed the specific numerical ceilings for each of the powers as set forth in the joint Anglo-French proposals of 1954.[26]

The Soviet proposal also acknowledged that there were "possibilities beyond the reach of international control for organizing the clandestine manufacture of atomic and hydrogen weapons for a surprise attack" even though it continued to call for their total prohibition. It recognized, finally, the need for a permanent control organ which would establish inspection posts to warn of dangerous concentrations of military forces or equipment.[27] The Soviet position, in short, shifted as did that of the western nations, in that it recognized that the principal problem of inspection had become the prevention of surprise attacks rather than past production of fissionable material.

To the western powers the new Soviet proposals did not constitute an acceptable basis for disarmament. In particular, the control system against surprise attacks which the Soviet Union advanced was similar to the ground inspection system operating in Korea. On the basis of the experience with the Korean truce, this system was regarded as altogether inadequate by the western powers. One of its principal weaknesses was that Communist North Korea had required in one fashion or another advance notice whenever the United Nations "inspectors" intended to visit its installations.

Further, the western nations objected to the manner in which the Soviet suggestions were linked to a German settlement. The link involved the withdrawal of the forces of the occupying powers from Germany and the liquidation of military bases in that country. By freezing armed forces and conventional armaments at the levels of December 31, 1954, moreover, a German military contribution to

[26] For the United States, the U. S. S. R., and China, 1,000,000 to 1,500,000 and 650,000 for the United Kingdom and France. The Soviet ceilings differed from those proposed by the United Kingdom and France in only one respect, that levels for states outside the five big powers were specified only to be "considerably lower" than levels outlined for the big powers, rather than roughly 1 percent of population.

[27] Collection of Documents, p. 390.

NATO would have been prevented. The Soviet proposal also called for the inclusion of Communist China in any talks concerning the limitation of China's armaments and finally a reciprocal agreement to halt atomic tests.

2. THE GENEVA CONFERENCE

The Eden plan

At the Geneva Conference in July 1955, the British Prime Minister proposed a joint inspection of the armed forces in a specified zone on both sides of the Iron Curtain in Europe. This proposal was designed essentially as a pilot project. It was not a proposal for disarmament as such, nor was it a proposal for a system of European security, nor for total inspection. The plan sought merely a trial run in the practical problems involved in international inspection and was designed to give both the western nations and the Soviet Union an opportunity to see how it would function. Further, the plan was expected to increase mutual confidence. On September 13, the United Kingdom supplemented the Eden plan with a memorandum detailing the rights, powers, and methods of an international control organ. In presenting the memorandum, the British noted that they had reached the conclusion that "no machinery of control at present conceived can be 100 percent effective in insuring the security of all states against deception and foul play in this nuclear day and age." [28]

The Faure plan

At the Geneva Conference, France urged that the economic aspects of worldwide disarmament be emphasized. Premier Faure proposed that the nations agree to restrictions on their military expenditures and allot savings to an international fund for economic development and mutual assistance.[29] The concept of applying financial and material resources diverted from armaments to underdeveloped regions was similar to one previously expressed in congressional resolutions in this country [30] and by the President in an address in April 1953.[31]

The "open skies" and exchange-of-blueprints proposal

At the Geneva meeting, the President of the United States proposed that the Soviet Union and this country arrange for the exchange of complete blueprints of military establishments and provide facilities for aerial reconnaissance of each by the other—

> to convince the world that we are providing as between ourselves against the possibility of great surprise attack, thus lessening danger and relaxing tension.[32]

This proposal was presented as a "confidence-building" agreement between the two major powers. The concept of aerial surveys had been included in the original Baruch plan in 1946 and specified as essential to the program of disclosure and verification suggested by the United States in April 1952. It was, however, given a new role and emphasis in the President's proposal in 1955 since, in this instance, it was addressed to the problem of preventing surprise attacks.

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[28] Commonwealth Survey, vol. 1, September 6, 1955, p. 761.

[29] A draft elaborating the French proposal was submitted to the Subcommittee of the United Nations Disarmament Commission on August 29, 1955. Subsequently the French presented three working papers outlining the structure of an international disarmament organization and defining the powers of the control authority and the objects which should be subject to control. See Collection of Documents, pp. 355, 360, 363, and 365.

[30] S. Res. 150, 83d Cong., 1st sess., and S. Res. 71, 84th Cong., 1st sess., Collection of Documents, pp. 788 and 796.

[31] Collection of Documents, p. 990.

[32] Collection of Documents, p. 339.

The "open skies" plan was elaborated in the fall of 1955 to include (1) a stage-by-stage exchange of "complete blueprints" by principal nations beginning with the United States and the Soviet Union; (2) machinery for verification manned by permanent on-the-spot observers to certify the accuracy of information disclosed and to give warning of preparation for surprise attack; and (3) "ironclad" agreement under which each country would submit to the other's unrestricted—though monitored—aerial reconnaissance.

A sequel to the "open skies" proposal was advanced in a letter from the President to Soviet Premier Bulganin on March 1, 1956. He stated that, assuming the satisfactory operation of the proposed air and ground inspection system—

> the United States would be prepared to work out, with other nations, suitable and safeguarded arrangements so that future production of fissionable materials anywhere in the world would no longer be used to increase the stockpiles of explosive weapons.[33]

This proposal was directed toward "bringing under control the nuclear threat." It stressed the possibilities for peaceful utilization of atomic energy and served to demonstrate this country's concern with an actual limitation of the nuclear race. The President's letter was significant also in that it shifted the emphasis in our approach from the limitation of armed manpower to limitation of armaments and weapons which, he said, were "more subject to supervision, regulation, and control."

In the exchange of correspondence, the positions of the United States and the Soviet Union on inspection for a time seemed to be moving closer together. In May 1956, however, Russian spokesmen denounced the "open skies" proposal as an interest of "intelligence services" which would not contribute to disarmament or the establishment of control over the reduction of armaments.[34]

On December 10, 1955, the General Assembly, by a vote of 56 to 7 (dissents by the Soviet bloc), called on the United Nations Disarmament Commission's Subcommittee to continue negotiations and to give priority to such confidence-building measures as the President's proposals on aerial inspection and the Soviet Premier's proposal on ground control posts. The Assembly also suggested that account should be taken of the proposals of the other heads of government at Geneva and of a proposal by India for the suspension of experimental explosions of nuclear weapons and an "armaments truce."

3. DISARMAMENT SUBCOMMITTEE MEETINGS IN LONDON, MARCH–MAY 1956

United States proposals

The reappraisal of disarmament policy which the United States had undertaken in March 1955 formed the background for proposals presented in March 1956. First, the United States suggested that two "preliminary steps" be taken immediately to facilitate negotiation of an agreement.[35] These were: (1) Designation of areas of 20,000 to 30,000 square miles in the Soviet Union and the United States to provide testing ground for methods of control and inspection; (2) exchange of technical missions of 30 to 70 persons among the 5 member

[33] Collection of Documents, p. 352.
[34] New York Times, May 15, 1956, p. 8.
[35] U. N. Document DC/83, annexes 3 and 4.

states of the subcommittee to study the problem of inspection and control.[36]

Subsequently, in a tentative proposal the United States set forth step-by-step measures of disarmament which might take place during the first phase of a disarmament agreement.[37] These steps would begin with the designation of test areas, and the exchange of the technical missions previously noted. The next step would be the establishment of a preparatory commission which would set the reductions in manpower for each state during the first phase of disarmament. The United States suggested that in this phase the United States and the U. S. S. R. should cut their armed forces to 2,500,000 and the United Kingdom and France to 750,000. Corresponding reductions fixed by "an agreed application of the manpower levels as a basis for measurement," would be applied to armaments and military budgets. The exchange of full military blueprints, the freezing of defense budgets as of December 31, 1955, and the control and full inspection system would then go into effect concurrently. Subsequently, with other States joining, a permanent "armaments regulation commission" would be set up to which each nation would make available information on its possession and production of fissionable materials, nuclear weapons, and plans for nuclear tests. There would then be a "freeze" on fissionable material produced for nuclear weapons, limitation of nuclear tests, and the scheduled reductions of manpower. If these steps during the first phase of disarmament were accompanied by an easing of international tension, the nations could then proceed to consider measures of even greater disarmament.

The Anglo-French synthesis

Great Britain and France submitted joint proposals at the London meeting. These were revisions of earlier positions, some of which had been supported by the United States. Like the United States plan, the Anglo-French approach suggested disarmament by stages.

The joint proposals called first for a declaration of the participating states that they considered themselves prohibited from the use of nuclear weapons except in defense against aggression. This declaration would be accompanied by a freeze on current armaments levels and effective control machinery including aerial and ground inspection. From this point, the nations would proceed to reductions in conventional armaments and restrictions on nuclear tests. In the final stage, conventional armaments would be cut to the lowest possible levels. Nuclear tests would then be banned and the production and use of nuclear weapons prohibited.[38] Progression from stage to stage would require unanimity in an executive committee set up to supervise the plan, with provision for referral of disputes to the Security Council.

The Anglo-French plan was aimed at reconciling the United States demand for effective inspection and control first and the Soviet demand for agreement on reduction prior to inspection. This policy of reconciliation was expressed by Jules Moch, the French representative, in the formula adopted by France: "Neither control without disarmament, nor disarmament without control, but, progressively, all the disarmament which can be controlled.[39]

[36] U. N. Document DC/83, annexes 3 and 4.
[37] U. N. Document DC/83, annexes 6 and 9.
[38] U. N. Document DC/83, annex 2.
[39] U. N. Document DC/SC 1/PV.69, p. 10.

Soviet position

At the London Conference the Soviet Union omitted the usual demand for a ban on nuclear weapons as the first step toward armaments limitation. Its proposals stressed controlled reduction of conventional arms. They called for a freeze on current levels of armed forces, armaments, and military budgets within the first 3 months of agreement and the creation of an international disarmament control agency with "unimpeded" access to certain ground installations for inspection against preparations for surprise attack. They also envisioned a reduction in military forces to a maximum of 1.5 million troops for the United States, the Soviet Union, and Communist China, 650,000 for Great Britain and France, and 150,000 to 200,000 for all other nations. In addition, they suggested the "creation in Europe of a zone of limitation and inspection of armaments" composed of Germany and "adjacent" states, in which foreign troops would be limited and atomic weapons banned. Independent of agreement on disarmament, the Soviet proposals also called for a discontinuance of thermonuclear weapons (hydrogen bomb) tests, the banning of atomic weapons in Germany, and reductions of 15 percent in military budgets.[40]

Significance of London talks

The London sessions reflected some mutual accommodation in the positions of participating nations. As the U. S. S. R. had once requested, the United States agreed to consider certain reductions in armed forces prior to settlement of political issues and offered to include foreign bases and facilities in the first step in establishing control procedures. The American proposals also contained the possibility of setting a numerical ceiling for the armed forces of nations not ranked among the great powers. Most significant, specific steps in the progressive reduction of all armaments were listed, at least for the first phase of disarmament.

The Soviet Union, on its part, agreed that international inspectors should be at their posts before reductions actually began, with the power to check agreed reductions of arms, as well as concentrations for surprise attacks. It also named the types of installations, such as airfields, sea and land bases, factories, and munition dumps, which would be subject to ground inspection. Not included, however, were installations related to nuclear energy.

The positions of the Soviet Union and the western powers were not reconciled at London. For the western powers, the principal shortcoming of the Soviet approach was its failure to do more than make a reference to aerial survey, a matter which they regarded as essential to effective inspection. The lack of consideration it gave to nuclear weapons was also considered a serious drawback, all the more because, with the spread of the knowledge of atomic energy, such weapons were likely to come into the possession of countries other than the Soviet Union, the United Kingdom, and the United States, thus raising "fourth country" problems. Moreover, although the numerical levels of armed forces advocated by the U. S. S. R. had been advanced for illustrative purposes by the United States, Great

[40] U. N. Document DC/83, annex 5.

Britain, and France in 1952, in 1956 the western powers did not include these figures in their proposals.

As the French delegate pointed out to the Soviet delegate in connection with the Soviet advocacy of the 1,000,000 to 1,500,000 level:

> * * * [When] you say that the U. S. S. R. has taken over the levels proposed by the western powers you are correct arithmetically, but not politically, since the levels we proposed were placed in a different context from that of your proposal. It was different * * * both because the levels in question were reached at the end of a number of general operations covering all aspects of disarmament and because provision was made for a scheme of stationary or mobile ground and aerial control systems which does not appear in so complete a form in your proposal. Accordingly, there is a similarity in the figures, but not in the facts.[41]

In a joint statement issued at the conclusion of the talks on May 4, Canada, France, the United Kingdom, and the United States noted that the differences between the Soviet Union and the other participants had not been reconciled. However, they expressed their "conviction that a reconciliation of the opposing points of view is possible and necessary * * *." [42]

This statement revealed that the western powers held in common the following principles of disarmament: First, that disarmament should proceed by stages, with progress to a new stage depending on the satisfactory execution of the preceding one and "upon the development of confidence through the settlement of major political problems." Second, that the program of disarmament should begin, under a system of effective international control, with significant reductions in armed forces and with corresponding reductions in conventional armaments and military expenditures. Third, that the program should at an appropriate time and with proper safeguards halt buildup of stockpiles of nuclear weapons with all future production of nuclear materials devoted to peaceful uses.

Other views included by the western powers in their statement called for a strong control organization with inspection rights, operating at the outset of actual disarmament; preliminary experiments with inspection methods on a limited scale; and provision for the suspension of the program, in whole or in part, if a major state failed to carry out its obligations or if a threat to the peace should develop which would be subject to chapter VII of the United Nations Charter.[43]

E. Summary Observations

In a decade of negotiations on disarmament there has been some evolution of the positions of the western powers and the Soviet Union. Modifications appear to have been induced by changes in the world situation and technological advances, and to accommodate the views of each other and other countries. In spite of changes in policy, however, significant differences continue with respect to all of the principal issues which have arisen—control of nuclear weapons, level of armed forces and armaments, inspection and control, phasing and the relation of disarmament and political settlements.

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[41] U. N. document DC/93, annex 12.
[42] U. N. document DC/93, annex 10.
[43] Ch. VII provided for enforcement action by the Security Council if that organ determined the existence of a threat to the peace, breach of the peace, or act of aggression.

1. CONTROL OF NUCLEAR WEAPONS

A major part of the negotiations on disarmament have dealt with control of nuclear weapons. The United States initiated these negotiations in the Baruch proposal, and the Baruch proposal remained the basis of United States policy for many years. A shift did not become apparent until 1954 when the United States ceased to call for international authority over all atomic energy activities and suggested instead a more limited international role in this area.

Through the long period in which the United States had either a monopoly or preponderant superiority in nuclear weapons, the Soviet Union argued for the immediate and complete prohibition of atomic weapons "in any circumstances whatsoever," and the destruction of all existing stocks of such weapons. At the same time, however, the U. S. S. R. pressed the development of its own technology in nuclear weapons. As it progressed in this effort, modifications appeared in the Soviet position on disarmament. In the May 10, 1955, proposal, for example, the Russians no longer called for an absolute prohibition of nuclear weapons during the first stage of disarmament. They also recognized the validity of the employment of such weapons in defense against aggression, at least as defined by the Security Council, during that stage.

The Soviet proposals at the London meeting in 1956 omitted the problem of atomic weapons entirely, except to call for a ban on the testing of hydrogen weapons. The Soviet representative expounded the view that since agreement on control of nuclear weapons was difficult, the negotiating countries should concentrate instead on reductions in conventional weapons. In a statement in May 1956, announcing cuts in its armed forces, the Soviet Union still claimed to favor "the complete prohibition of atomic and hydrogen weapons, the ending of their production and the destruction of existing stocks of these weapons." [44] That, however, was a statement of a general principle or ultimate aim and as such did not differ from the position of the other principal powers including the United States.

In one area, the Soviet position has drawn closer to that of the United States. In 1956 the Russians agreed to the basic principles of the atoms-for-peace plan. Under this plan originally advanced by the President of the United States "have nations" are to contribute fissionable materials to "have-not nations" to assist the latter in developing atomic energy for peaceful purposes.

The atoms-for-peace plan is not presently involved directly in disarmament negotiations. It is not inconceivable, however, that eventually it might be since there is general agreement on the desirability of diverting fissionable material now used for armaments production to peaceful purposes. Moreover, it is possible that some experience in inspection and control might be gained under the plan which could be applied in a disarmament program particularly as "fourth countries" become producers of atomic energy.

British and French policies for many years suggest an effort to achieve a synthesis which would include features of both the United States and the Soviet positions on control of nuclear weapons. The two countries originated a plan of gradual progression toward prohibition of nuclear weapons and tests for military purposes which

[44] New York Times, May 15, 1956, p. 8.

would be paralleled by the establishment of a nuclear control system and a reduction in conventional weapons. The United States joined in sponsoring this plan on March 8, 1955, and the Soviet Union adopted a similar approach in its May 10, 1955, proposals.

Since that time, however, the United States and the Soviet Union have been less specific in their proposals on nuclear questions. When the British-French synthesis was presented at London, the Soviet Union held that it did not solve the problem of nuclear weapons. It specifically objected, moreover, to recognizing the validity of the employment of nuclear weapons against aggression even during the first stage of disarmament unless the Security Council (where the veto applies) were given the right to define "aggression."

In its most recent proposals the United States has sought to work out with other nations—

> suitable and safeguarded arrangements so that future production of fissionable materials anywhere in the world would no longer be used to increase the stockpiles of explosive weapons.[45]

As far as specific steps in this direction are concerned, the United States at the London Conference, as part of its tentative proposal for a first stage, called for agreement not only to end the use of such materials for the manufacture of explosive weapons, but also to provide regular transfers from past production of fissionable materials to peaceful uses. In addition, this country asked for agreement to limit and monitor nuclear weapons tests.

2. LEVELS OF ARMED FORCES AND ARMAMENTS

Until 1955 the Soviet Union proposed a reduction by one-third in conventional armaments and armed forces of the permanent members of the Security Council. The western powers were opposed for two principal reasons. First, the actual size of the Soviet forces were unknown and the U. S. S. R. consistently rejected the taking of a verifiable census. Second, the forces of the Soviet Union were believed to be far larger than those of the western nations. A percentage cut, therefore, would have left the U. S. S. R. in a position of superiority while the free nations would have had to strip themselves of the counterbalancing factor of nuclear superiority which the Soviet Union demanded as a condition for the one-third cut.

In 1952 the western powers proposed as an alternative to a percentage cut, a reduction of force levels. They suggested as illustrative maximum forces of 1 to 1.5 million for the Soviet Union, the United States, and China; for Great Britain and France 700,000 to 800,000; and for other countries generally less than 1 percent of their population. Britain and France advocated these levels again in 1954 in modified form, but the United States did not continue its endorsement. At the London meeting in 1956 this country discussed as part of the first stage in a broad disarmament program a ceiling of 2.5 million for the United States, the U. S. S. R., and China, 750,000 for the United Kingdom and France, and 500,000 for other states. The Soviet Union, on the other hand, endorsed the million to a million and a half level, with 650,000 for France and the United Kingdom and, subsequently, 150,000 to 200,000 for all other states.

[45] U. N. Document DC/83, annex 9.

As previously noted, the Soviet Union has emphasized in public statements that it has accepted the levels formerly advocated by the western nations. The latter, however, point to the changes in the framework of negotiations since these levels were originally put forward. Further, they hold that the Soviet acceptance of the earlier levels is in the context of an unsatisfactory system of control and staging and without agreement on nuclear weapons. Recent statements by western leaders have also emphasized that cuts in manpower are not as meaningful as cuts in armament since reserves can be augmented and men can be remobilized with relative ease. Finally, the United States has taken the position that reduction to low force levels should be accompanied by major political settlements. In the absence of such settlements, it is contended, drastic reductions "would increase the danger of the outbreak of war at some points in the world, and of such a war in turn spreading to involve all nations, particularly major nations."[46]

3. INSPECTION AND CONTROL

From the outset a basic cleavage has existed over the question of inspection and control. The Soviet Union has generally resisted proposals which involve verifying the carrying out of disarmament obligations. The western nations, on the other hand, have placed great emphasis on inspection. They stress that without effective inspection, disarmament can give rise to a sense of security when, in fact, security does not exist. Since the Soviet Union has followed in the past far more stringent policies of secrecy than the western nations, inspection undoubtedly entails greater adjustments for the former, particularly with respect to conventional weapons. From the western point of view, however, Russian refusal to accept inspection plans arouses suspicion as to good faith and so remains a principal barrier to disarmament.

Inspection is now regarded by the western powers as necessary, not only to insure that disarmament agreements are being observed, but also to prevent surprise attacks. During the past year the United States has championed aerial inspection. Soviet acceptance of this approach, which involves the use of advanced aerial photographic techniques, has not been forthcoming.

The Soviet position on inspection, nevertheless, now appears to be closer to that of the western nations. From the barest mention of the subject in 1946, it moved to acceptance of the concept of periodic inspection and special investigations conducted in case of suspicion. By 1954 the Russians had agreed to the principle of inspection on a continuing basis. In May 1955 they called for an international control organ which would establish in all states concerned control posts at large ports, at railway junctions, on main motor highways and in airports. Most recently the Soviet Union has recognized that an international control organ should have a staff of inspectors, recruited internationally, permanently stationed in the participating nations. Within the bounds of their control functions, the Russians have recognized that the inspectors should have "unimpeded access" to areas and installations even beyond those necessary to check on

[46] U. N. Document DC/83, annex 12.

concentrations of forces. In their London proposals, however, the Soviet Union's only mention of aerial inspection was:

> At a specified stage of the execution of the general disarmament program, when confidence among states has been strengthened, the countries concerned shall consider the possibility of using aerial photography as one of the methods of control.[47]

With respect to violations of disarmament agreements, another aspect of the control problem, the Soviet Union has not accepted the position of the western nations. The western approach on this point is suggested by the Baruch plan which specified that the veto was not to apply in meting out penalties for violation of an agreement on international control of atomic energy. Later the western powers indicated that they favored having violations of a control agreement reported to the United Nations, and to the participating states which could then impose sanctions or take appropriate defensive measures.

The Soviet Union has opposed control plans of this kind for a decade, insisting that any punishment be carried out only according to national legislation of the individual states, and resisting any move to circumvent the veto in this connection. It has refused to accept the United States suggestion that an international control agency have authority to impose penalties. When the Soviet Union included an international control organ in its proposals of May 1955, and later, it still sought to limit the enforcement powers of such an agency to making recommendations to the Security Council.

4. PHASING

At the present time, some of the issues of disarmament revolve less around what is to be done than when it is to be done. As early as 1945, the United States, Great Britain, and Canada advocated that disarmament should proceed by separate stages, "the successful completion of each one of which will develop the necessary confidence of the world before the next stage is undertaken." Since that time, the West has devised various timing schemes to bring about gradual, safeguarded reductions in armaments.

The Soviet Union, on the other hand, began with an advocacy of the immediate abolition of atomic weapons and in later proposals called for other precipitous action. It was not until 1954 that the Soviet Union dropped its insistence that the use of nuclear weapons be prohibited prior to the adoption of a more comprehensive plan of disarmament. At the same time the Russians introduced a two-stage concept of disarmament. The concept was similar to one previously advanced by the British and French. It varied, however, in that the control organ would not have been required to be in effective operation before reductions of armaments began. Most recently, the U. S. S. R. has accepted the western view that control facilities should be in place before actual reductions start.

Differences persist on the question of whether a full disarmament program should be laid out at once, with an agreement signed covering the entirety, or whether agreements should be concluded to cover each stage in turn. The United States has proposed the latter approach. Britain and France look to a comprehensive plan and in this respect

[47] U. N. Document DC/83, Annex 5.

are at variance with the United States position. These two nations, though, have made clear that there should be unanimous assent in the control organ or the Security Council that the provisions of one stage were complete, that the control facilities were in existence and that the necessary conditions of confidence in international relations existed, before proceeding to the next stage.

The four western powers are agreed that provision should be made for part or all of the disarmament program to be discontinued if a principal state fails to carry out its obligations or a threat to the peace arises. The Soviet Union, on the other hand, favors the adoption of a treaty which would bind the parties to a 3-year program. It is skeptical of disarmament in partial steps without a firm commitment on a whole program, but has not taken a public position on the recourse of a country abiding by disarmament obligations should another state act in violation of them.

5. DISARMAMENT AND POLITICAL SETTLEMENT

The United States and the other western powers generally hold that comprehensive and drastic reductions in armaments can be carried out safely only as parallel progress is made in the solution of important political issues in the world. Although the Soviet Union in May 1955 agreed that political settlements were a necessary condition of large-scale disarmament, it also argues that armament reduction in itself will serve to ease tensions and in general opposes linking disarmament with political settlements.

The western powers have made some alterations in their views on the relationship of disarmament and political settlement in the light of the Soviet position. They have agreed that limited measures of disarmament might be undertaken for the purpose of building international confidence even before progress in settlement of outstanding political issues.

TECHNICAL PROBLEMS

STAFF STUDY NO. 4

OCTOBER 7, 1956

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PREFACE

By Senator Hubert H. Humphrey, Chairman

Increasingly, the assumption is being made that the "balance of terror" may spare the human race the catastrophe of nuclear war. Even if this assumption were correct, and there is no assurance that it is, the harrowing race to maintain the balance prevents civilization from developing its fullest potentialities. The nuclear race channels a large share of man's resources, energy, and genius into destructive ends. It denies to the people of the world that sense of security and faith in the future which individuals need to achieve their maximum growth. The fear it breeds may be suitable for tyranny. It is not conducive to an atmosphere of freedom.

It seems to me that control and reduction of armaments is imperative. The attainment of international disarmament, however, is not made easier by its urgency. The political problems involved are as difficult as ever. The technical problems continue to grow more complex as weapons and military organizations become more intricate. Disarmament will be safe and practicable only to the degree that progress is made in solving the political and technical problems.

This staff study, the fourth in a series being prepared at my request on various aspects of the disarmament question, outlines the scope of the technical problems involved in achieving disarmament.

As this study points out, there would be many difficulties in obtaining a satisfactory disarmament program, even without the complication of political issues which stand between the Communist and noncommunist worlds. Is there, for example, any formula by which a balanced reduction of forces and armaments can be devised which will be equitable and acceptable to all sides? How many submarines would equal an aircraft carrier in such a formula? These are the types of questions with which this study is concerned. Such questions bring to mind, moreover, an even more fundamental question. Can a system of inspection and control be devised which is sufficiently foolproof to make it possible, in theory at least, to reduce arms even in a period when suspicion, not trust, dominates relations among many states?

The study reemphasizes that one of the great technical problems confronting us is that there is no feasible method at present of detecting hidden stockpiles of nuclear weapons. Awareness of this fact makes it reckless to consider an agreement to destroy all stockpiles when there would be no way of ascertaining whether the agreement had been observed. It leaves disarmament planners with several alternatives; they can wait until some method of detection is found and concentrate scientific knowledge on this search; they can bypass this barrier in controlling nuclear weapons by working along other avenues such as reduction of armed forces and conventional weapons; they can attack the nuclear threat from a different direction by work-

ing to prevent the stockpiles from growing bigger; and they can attempt to control the methods by which nuclear weapons are delivered.

The technical roadblock created by our inability to detect stockpiles of bombs warns us of the need to seek agreement with all possible speed on those aspects of disarmament where technology presents a gateway, rather than a roadblock. One such area which is already available is that of detection of large nuclear-test explosions. Although the Soviet Union does not announce its tests to the world, as the United States does, we are not only able, according to competent testimony received by the committee, to detect large tests that occur but we also have the ability to determine, to a considerable extent at least, their magnitude. The significance of this technical knowledge is that if the United States and the Soviet Union were to agree to ban the testing of large nuclear weapons, it would not be necessary to rely on the Soviet's word alone that the agreement was being observed. Nor would such an agreement, to be effective, require an elaborate inspection system. Our detecting methods are presently located outside the Soviet Union. Many other nations have means to detect large nuclear explosions wherever they occur. Any violation of an agreement would, therefore, be almost instantly known to the world at large. Certainly our negotiators should not overlook these facts in attempting to reach agreement with the Russians on the control of armaments.

This study also points up another aspect of the disarmament problem. With scientific research continuing in a technological race between the United States and the Soviet Union, new weapons systems may soon be devised which will render present disarmament proposals obsolete or, at least, inadequate. This applies to the race for the development of the intercontinental ballistic missile as well as weapons yet unknown.

Staff Study No. 4: Control and Reduction of Armaments, Technical Problems, is a valuable introduction for those of us who are not military experts but who, nevertheless, are faced with the challenge of finding an arms-control agreement which will enhance rather than jeopardize our security. This study was prepared under the direction of the subcommittee staff, by Col. Charles H. Donnelly, senior specialist in national defense, Legislative Reference Service, Library of Congress. It does not necessarily reflect the views of the subcommittee or any of its members.

October 7, 1956.

CONTROL AND REDUCTION OF ARMAMENTS

TECHNICAL PROBLEMS

A. INTRODUCTION

This staff study is concerned with the main technical problems which would require solution in order to make any disarmament system workable. As far back as organized society has resorted to the use of arms, either to inflict its will upon others or to defend itself from aggression, it has had the concomitant problems of keeping its armament program within the bounds of its means and insuring against undue destruction. When risk of devastation and the expense of armaments have become unusually great, leaders have tried to find a formula by which their people could be relieved of at least some of the burdens without worsening their defensive position vis-a-vis other states. Disarmament, therefore, is a subject wherein there have been many attempts to achieve international agreement and upon which many discourses have been written. The terminology peculiar to the subject is often used loosely. Some definition and explanation of terms is therefore in order.

1. Armaments

The terms "conventional" and "unconventional," as applied to weapons, the forces which use them and the kind of warfare in which they would be employed, have often been used loosely; the same applies to the term "weapons of mass destruction." In 1948 the United Nations Commission for Conventional Armaments adopted the following definition:

*** * * weapons of mass destruction should be defined to include atomic explosive weapons, radioactive material weapons, lethal chemical and biological weapons, and any weapons developed in the future which have characteristics comparable in destructive effect to those of the atomic bomb or other weapons mentioned above.[1]**

As used herein, unconventional weapons will be regarded as including nuclear explosive weapons (regardless of their power), lethal chemical, biological and radiological weapons, and any weapons developed in the future with characteristics comparable in destructive effect to those mentioned above. Conventional weapons will include all which do not fall into the unconventional category. Those referred to as weapons of mass destruction will be unconventional types whose destructive effect is so great as to render them unsuitable for tactical use. Unconventional weapons of the low-yield atomic type might be used in so-called conventional warfare, as the use of an atomic weapon to destroy an aircraft carrier or an atomic projectile to neutralize part

[1] Department of State Bulletin, August 29, 1948, p. 268.

of a battlefield. In these cases the unconventional weapons would supplant less effective or less powerful conventional weapons, but the principles of their use would be relatively the same.

2. Definition of "disarmament"

"Disarmament" is used herein to designate any plan or system for the limitation, reduction, or abolition of armed forces, including their arms and equipment and other related items such as military bases and budgets.[2] It could be argued that a plan for freezing military expenditures at current levels is hardly a disarmament plan. For the purposes of this study, however, it will be considered as such since budgetary limitation has frequently been considered in this connection in negotiations on disarmament.

Disarmament is brought about through the process of placing a limitation or ceiling on the size of armed forces, armaments, or military expenditures and then taking the necessary measures to bring these elements within the ceiling set. These measures are by reduction, where the ceiling is below existing levels, and freezing, where present levels are to be retained but not exceeded. In actual practice, an agreed ceiling might actually exceed the existing level of strength of a country at the time of the agreement, and this ceiling might never be attained. This was the case with the United States following the 5–5–3 naval limitation agreement between the United States, Great Britain, and Japan, signed in 1922. During the life of the treaty the United States never built up to the tonnage permitted.

3. Definition of "control"

The term "control" will be used to denote the regulatory device by which the terms of a disarmament plan would be implemented. Control might be retained by a sovereign state within its own jurisdiction or it might be vested by agreement in an international body or another state to administer. A nation undertaking, unilaterally, to reduce its forces, as did the United States following World War II, would naturally exercise control of its own disarmament process. In the case of defeated countries, disarmament is usually imposed and controlled by the victor nations.

Control of an international disarmament agreement has frequently been left to the honor of the participants, as in the case of the United States-British agreement in 1817 (Rush-Bagot agreement), for limitatiton of arms on the Great Lakes. Under present conditions of mutual distrust between nations, however, any plan for control or limitation of arms, to be acceptable to the participants, in all probability would need to contain some provision by which the parties could be assured as to the extent to which disarmament was being carried out by the other participants in the agreement. The technical problems of carrying out such a provision would be considerable, and it must be observed that the greatest difficulty encountered in negotiations since World War II has been lack of accord on this question. So far, in the

[2] Hearings before the Senate Foreign Relations Subcommittee on Disarmament (hereafter referred to as "subcommittee hearings"), pt. 1, January 25, 1956, p. 13. Mr. Harold E. Stassen, special assistant to the President for disarmament, said: "* * *'disarmament' has come to mean, not the literal meaning of the dictionary, but any offer to reach any kind of agreement or limitation or control or inspection affecting armed forces and armaments. It has taken on a special meaning in international circles."

view of the West, the Soviet Union has been unwilling to permit realistic inspection, which the former considers a vital aspect of control.

Many believe that if history has shed any light at all on this problem, it has shown that a disarmament plan, to be effective, must carry with it a means of observation or inspection by which other parties to the agreement can be assured as to the manner in which the agreement is being kept. President Eisenhower expressed the view of the United States in this matter at Geneva on July 21, 1955, when he said:

> No sound and reliable agreement can be made unless it is completely covered by an inspection and reporting system adequate to support every portion of the agreement.
>
> The lessons of history teach us that disarmament agreements without adequate reciprocal inspection increase the dangers of war and do not brighten the prospects of peace.[3]

Marshal Bulganin at least outwardly agreed with the President when he told the Supreme Soviet on August 4, 1955:

> The President of the United States justly remarked that each disarmament plan boils down to the question of control and inspection.[4]

B. BACKGROUND

The record of previous attempts to bring about reduction of armaments is one wherein there have been a few successes but many failures. Where there has been a degree of success, it has usually been accompanied by political accord and mutual trust, as in the case of the Rush-Bagot agreement limiting armed naval vessels on the Great Lakes. Mostly, however, disarmament attempts have failed at the conference tables or, where agreement was obtained, failure came later at the control stage. Two instances of such failure are cited in illustration:

(1) The Treaty of Versailles, signed June 28, 1919, imposed a detailed limitation upon the German Armed Forces and provided for inter-Allied commissions of control. These commissions had broad powers to inspect.[5] Nevertheless, they found themselves being circumvented by the Germans when they undertook to make their inspections.[6] In this instance, even though there was an inspection system, it failed to work properly largely because of two factors: the system had been unilaterally imposed upon a defeated people who resented what they considered to be an intrusion, and the Allies did not deal firmly enough with the situation.

(2) The Japanese agreed when they signed the Washington Naval Treaty of 1922[7] that the fortifications in their Pacific insular possessions would remain in status quo as of the date of signing. Years

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[3] U. S. Congress, Senate Committee on Foreign Relations, Subcommittee on Disarmament. A Collection of Documents, 1919–55, 84th Cong., 2d sess., Washington, U. S. Government Printing Office, 1956, p. 340. Hereinafter referred to as "Collection of Documents."

[4] Bulganin's report on Geneva Conference, The Current Digest of the Soviet Press, vol. VII. No. 29, August 31, 1955, p. 17.

[5] Collection of Documents, pp. 1–12.

[6] Morgan, J. H., Assize of Arms, New York, 1946, pp. 60–68. General Morgan gives a firsthand account of Allied attempts to enforce the disarmament of Germany after World War I. In an unguarded moment the Inter-Allied Military Commission of Control allowed the Germans to set up a commission to act in a liaison capacity with the Allied Commission, ostensibly to facilitate the work of disarmament. It soon became evident that the German liaison officers were primarily concerned with delaying and sabotaging, rather than expediting, the work of the Allied officers. Several instances of assault on the British and French officers were related.

[7] Collection of Documents, op. cit., p. 13.

later, there was suspicion that Japan was violating the terms of the treaty with respect to these islands, but there was no right of inspection by which such violations could be determined.

The League of Nations' attempts to achieve disarmament foundered when the delegates could not find a formula acceptable to all of the great powers and, in the 10 years of its existence, the United Nations has yet to reach agreement on any kind of a solution. Present-day negotiations to bring about disarmament agreement stem from article 26 of the United Nations Charter which states that—

> * * * The Security Council shall be responsible for formulating, with the assistance of the Military Staff Committee referred to in article 47, plans to be submitted to the members of the United Nations for the establishment of a system for the regulations of armaments.

The General Assembly of the United Nations, on December 16, 1955,[8] recognized the need "to continue to seek agreement on a comprehensive programme for disarmament * * *" and noted that special technical difficulties had arisen in regard to the detection and control of nuclear weapons material.

Classification of forces and weapons as to their use

Earlier attempts to solve the disarmament problem have sometimes begun with attempts to classify forces and armaments as "offensive" or "defensive." At the World Disarmament Conference at Geneva in 1932 the delegates labored to draw a line between weapons of offense and weapons of defense, with the objective of placing a limitation on forces and weapons which might be used for aggressive action. The difficulty lay in the fact that even though a force or a weapon might be employed for offense, the user might actually be engaged in a counterattack to repel an invasion. As M. Tardieu said:[9]

> Every arm can be employed offensively or defensively in turn. * * * The only way to discover whether arms are intended for purely defensive purposes or are held in a spirit of aggression is in all cases to inquire into the intentions of the country concerned.

Experience has indicated that for purposes of armament limitation, classification of forces or weapons as offensive or defensive in character is not a realistic approach. Artillery, tanks, nuclear bombs, submarines, fighter planes—each category may be used offensively or defensively depending on the purpose of the action. A weapon may in fact be used offensively on one occasion and defensively the next. The United States Strategic Air Command, for example, is a defensive force in that it is intended to serve as a deterrent against aggression.[10] If the United States were attacked, however, this command would actually be employed as an offensive force, in retaliation.

While it is true that most weapons have been designed with a particular purpose in view, they are often used for other purposes and a specific weapon is not necessarily used against other weapons of the same type. An example is the rocket launcher designed for individual use—the bazooka, as it is popularly known. This weapon was designed to give the individual soldier an effective defense against the

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[8] Collection of Documents, op. cit., p. 394.
[9] League of Nations, Records of the Conference for the Reduction and Limitation of Armaments, series B, Minutes of the General Commission (Geneva, 1932–33), pp. 53, 51.
[10] Department of Defense, Semiannual Report, January 1 to June 30, 1954, p. 259.

tank. He also uses it on occasion to knock out pillboxes and other field fortifications. It is not a suitable weapon, however, for use against another bazooka.

C. CONTROL OF FORCES AND ARMAMENTS

Those engaged in the problem of disarmament have considered many different ways of applying limitations including the eight listed below:

1. *Qualitative disarmament*—limitation as to form, function, or effect. Restrictions against the use of weapons deemed aggressive or offensive.
2. *Quantitative limitation*—a ceiling on the numbers of military personnel or weapons, by category.
3. *Budgetary limitation*—the freezing or reduction of military spending.[11]
4. *Limitation on resources devoted to disarmament*—the establishment of ceilings on the proportion of key resources, such as steel, which a country may use for arms.
5. *Limitation as to location*—for instance, the creation of a demilitarized area.
6. *Limitation of private manufacture and sale of arms, ammunition, and military equipment*—embargoes and export licenses are examples.
7. *Limitation as to manner of use*—the rules of warfare. An illustration is the outlawing of barbarous weapons.
8. *Limitation as to the desirability or necessity of use*—eliminating the need for armaments. Methods include international organization and attempts at pacific settlement.

This study will explore the technical problems involved in some of the main disarmament plans, rather than the political and moral aspects. The technical problems have been made much more complex since the advent of unconventional weapons. Because the problems differ widely as to the technology involved, those pertaining to control of unconventional weapons will be considered separately from those involved in the control of conventional forces and armaments.

1. Control of unconventional weapons

In 1926 a committee of the League of Nations investigated the technical aspects of enforcing a prohibition against the wartime use of poison gas and bacteriological weapons. It found that plants capable of manufacturing such weapons could quickly convert from their normal and legitimate peacetime manufacturing to the manufacturing of the wartime weapons; therefore, inspection by an international body would not only encounter serious difficulties but would serve no useful purpose. Besides, the committee emphasized, "such supervision would completely destroy secrecy in commercial affairs." One proposal made in this connection (by the Soviet Union) was to organize workers' committees or use trade unions in plants capable of manufacturing these weapons with a view to preventing such manu-

[11] Welles, Benjamin, New York Times, March 18, 1956, p. 19. The French have placed particular emphasis on this aspect of control.

facture, presumably in the event that the management should attempt to evade the agreement.[12]

Twenty years later, a new member of the family of unconventional or mass destruction weapons became the object of international concern, this time within the United Nations. The United States had developed and used the atomic bomb and realized the possibilities which might ensue if prompt and effective measures were not taken to bring this weapon under strict control. In June 1946 the United States proposed to the United Nations Atomic Energy Commission a plan (Baruch plan) for the international control of atomic energy. Coupled with this proposal was a stipulation that there must be an inspection system which would insure compliance with the terms of the control plan. This proposal was rejected by the Soviet Union largely on the ground that it constituted an unwarranted infringement of national sovereignty. Previous to this rejection a Scientific and Technical Committee of the United Nations Atomic Energy Commission, which included a Soviet national, had reported unanimously that it did not find any basis in the available scientific facts for supposing that effective control was not technologically feasible.[13]

Conditions have changed in the decade since the committee made its optimistic report. A considerable quantity of nuclear material has been manufactured both in and out of the United States. Improvements in technology now make it possible to produce vastly more explosive power from a relatively smaller amount of nuclear material. Unfortunately, technology has not kept up in two other respects. In checking past production of nuclear materials, it would be impossible to eliminate a certain margin of error in accounting. A substantial stockpile of nuclear weapons, therefore, could have been concealed. Once a stockpile of nuclear weapons has been shielded and hidden, there are presently no technical means by which these weapons can be detected.[14] To some extent similar problems exist with regard to detecting a deliberately concealed stockpile of chemical or biological weapons. It follows, then, that the type of control envisaged under the Baruch plan, that is, total accounting for all production, is no longer feasible. Both the United States and the Soviet Union have acknowledged this.[15]

Although it is presently not feasible to audit all the past production of nuclear materials, it is technically possible to keep a fairly close reckoning of materials which might be manufactured in the future and the purposes for which they are used. Accounting and control of fissionable materials made available to an International Atomic Energy Agency is envisaged in a draft statute pursuant to the President's atoms-for-peace proposal which was drawn up in April 1956 by representatives of 12 nations, including the United States and the Soviet Union, meeting under the aegis of the United Nations. This statute was agreed to in principle by all of the participants, and it is now

[12] Collection of Documents, op. cit., pp. 178, 179, 180, and 185. A current study of opinion by some manufacturers on the subject of factory inspection can be found in "Factory Inspection and Armaments Control," published by the Institute for International Order.

[13] Collection of Documents, op. cit., p. 197; also, Department of State publication 2787, 1947, p. 18.

[14] Subcommittee hearings, op. cit., pt. 1, pp. 9, 10; also Cavers, David F., The Challenge of Arms Control, Foreign Affairs, vol. 34, October 1955, pp. 52, 58.

[15] Subcommittee hearings, op. cit., pt. 1, p. 10.

being given further consideration by an international conference of 81 nations which convened at United Nations Headquarters on September 20, 1956.[16]

The statute, if adopted, would establish an International Atomic Energy Agency which would have as one of its functions the task of insuring "so far as it is able" that assistance granted by it or at its request would be used solely for peaceful purposes. Participants would pledge that none of the assistance provided through the agency would be used to further the development of weapons, and the agency would be granted authority to verify by inspection or by calling for reports as to whether this agreement was being complied with. Since the same reactor can be used to produce both power for peaceful purposes and plutonium which could be used for weapons, the Agency would attempt to insure that none of the fuel or reactor byproducts involved is directed to weapons. To accomplish its task, among other powers and safeguards, the Agency would have authority to approve facilities to be used in connection with the nuclear material which would be supplied, to prescribe health and safety measures, to control the disposition of nuclear material produced, and, through a system of records, reports, and on-the-spot inspections, to keep an accounting of fissionable materials supplied to and produced by the countries which would be the benefiting participants. According to its draft statute the Agency would be entitled to make its own measurements to verify reported data, and take various steps, such as the suspension of supply of materials, in the event of finding a violation.

This plan for control of nuclear materials destined for peaceful purposes obviously falls far short of being a disarmament plan. Only those countries having little or no fissionable materials would be covered, and these only to the extent to which they were furnished such materials under the agreement by the producing countries, such as the U. S. S. R., United States, Great Britain, or France. Nevertheless, if such a plan could be made to work it would be an invaluable source of technical and practical experience for the creation of a disarmament plan of much wider scope at some future time and the Agency itself might provide the nucleus for expansion into such a wider system.

There being no visible prospect of discovering a scientific technique for establishing complete accountability of nuclear materials produced in the past or even of detecting hidden nuclear weapons, an alternative approach is to control the means by which mass-destruction weapons can be delivered. This immediately brings into consideration the question, of guided missiles, particularly the ballistic type.

Many experts believe that, if any control over long-range ballistic-type missiles is to be achieved, the means of control must be established before these weapons are perfected. Launching sites might be identified by aerial or ground inspection or a combination of these methods. It must be assumed, however, that men who are capable of overcoming the manifold scientific and technological difficulties of creating a 5,000-mile missile are likewise capable of devising a launching system which can be effectively camouflaged.[17] The longer it

[16] For text, see Department of State Bulletin, October 24, 1955, pp. 666–672. Should the conference agree on a final statute, it would not go into effect until approved by participating states in accordance with their constitutional processes. In the United States, congressional action would be required.

[17] Subcommittee hearings, op. cit., pt. 1, pp. 14, 25, 41; ibid., pt. 3, p. 99; ibid., pt. 5, pp. 206, 207, 209, 287, and 290.

takes to bring about control of ballistic missiles, the more difficult it will become, technically, to work out a solution to this problem.

The fate of the Baruch plan for control of nuclear energy is an excellent example of what can happen. Had the United States proposal been put into effect at the time it was offered, it would have had a reasonable chance of success. The United States was the only country in production of nuclear materials at that time [18] and experts could have computed the end products within a relatively small margin of error, assuming that the figures submitted by the United States would not have been accepted at their face value. Now, 10 years later, with three countries producing nuclear weapons, auditing past production has become a practical impossibility. Moreover, the number of countries, and groups within countries, capable of producing nuclear weapons promises to become continually larger because of various programs, either proposed or already in effect, to promote the use of atomic energy for peaceful purposes. Such programs include the United Nations atoms-for-peace plan, the United States bilateral program, internal programs of various countries, and Euratom, which is the proposed European agency for the pooling of nuclear resources.

2. Control of conventional weapons and forces

The problem of effective control of the conventional type of weapons is much simpler in at least one respect: the quantity of tanks, artillery, warships, aircraft, or other conventional weapons necessary to obtain a strategic decision, or even a major tactical decision, cannot be hidden from detection as can a stockpile of unconventional weapons. Furthermore, the massing of forces armed with conventional weapons, sufficient to gain such a decision, could easily be detected by either aerial or ground inspection methods.

In setting up a control agency for conventional forces and weapons, valuable guidance can be had by observing the operation of the provisions for inspection in the Korean Armistice Agreement.[19] The inspection system functioned nominally for 3 years, but it never worked to the satisfaction of the United Nations command.[20] The agreement contained no provision for aerial inspection, and ground inspection was carried out by teams of inspectors from neutral nations. These teams were so restricted in North Korea that individual inspectors could not make free unannounced inspections. All inspections were made by teams composed of an equal number of members from the neutral countries which were nominated by the United Nations side and those nominated by the Communists. The results were strikingly similar to those in Germany following World War I.

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[18] Subcommittee hearings, op. cit., pt. 3, p. 128.

[19] Additional experience in inspection may eventually be gained from the Western European Union. When the Brussels Pact was amended in 1954 to expand the Western European Union and admit Western Germany as a member, agreements were reached as to the levels of certain categories of weapons and forces which the members might attain. Western Germany undertook not to manufacture in its territory atomic, biological, and chemical weapons. An agency for the control of armaments was created with authority to check weapons stocks. It was given power to examine statistical and budgetary information supplied by the members and NATO authorities and to undertake at regular intervals test checks and inspections at production plants, depots, and forces. The control agency was established in 1955 and 1956 was set up as the first control year. However, the system of armaments control is not yet functioning due to difficulties encountered in organizing the agency and staff and defining its powers and scope of operations. Moreover, to date Germany has received only a relatively small quantity of arms and has no effective combat force in being (unless the 20,000 border police could be so considered).

[20] Subcommittee hearings, op. cit., pt. 2, p. 76.

Visits by inspecting teams were known in advance, giving the military installation commanders enough time to put things in order before the arrival of the inspectors. Since the inspection system was not mutual in practice, the United Nations Command finally announced it would suspend inspections in South Korea.[21]

In terms of security resulting through disarmament, control of conventional weapons and weapons systems offers fewer technical difficulties than attempting to control military manpower. The difficulty inherent in hiding a stockpile of combat aircraft, tanks, or warships has already been pointed out. On the other hand, it would not be too difficult to circumvent a limitation on troop strength. This could be done in several ways. One way would be to turn over certain jobs to civilians, either by employing civilians—mechanics, for instance—or by contracting with civilian firms to handle certain jobs such as maintenance, transportation, and other logistical functions. Admittedly, military commanders would probably not like such arrangements, but would have to accept them if based on a national decision. Another reason why military manpower would be hard to control is that a large reserve force could be built up through a policy of short training periods and frequent rotations of personnel in and out of uniform. However, regardless of the number of militarily trained men available to a country, they would not constitute an effective combat force until equipped with weapons.

3. Control of defense budgets

Another means of controlling armaments is through budgetary procedures. Basically, this type of control involves a freeze on the amount nations spend for defense followed by reductions in defense expenditure according to an agreed-upon formula. Reductions in the military budget of a nation would occur each year and by an increasing percentage based on the amount of the original defense budget. The inspection system would include financial and economic experts acting somewhat as accountants going over the books of a company.

The budgetary approach has been currently advanced by the French who view it as being a complete check on armaments, but who are also willing to see it adopted as part of other methods of control.[22] The French have suggested that all or part of the savings resulting from a reduction in defense expenditure be put into a common pool for assistance to economically underdeveloped countries.

Under the French plan no country would be required to change its present practices of formulating and presenting its budget. A country would, however, be asked to present its budget to an international inspection authority in a form common to all nations. This practice is used at the present time by the members of the North Atlantic Treaty Organization. Thus, a common definition of military expenditure would be agreed upon and followed by all parties to the agreement. The international secretariat would be given the civil and military budgets submitted by governments to legislative bodies. The secretariat would then prepare a common nomenclature for all states and a list of the categories of military expenditure.

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[21] Announcement by United Nations Command, May 31, 1956. Department of State Bulletin, June 11, 1956, p. 967.

[22] Subcommittee of the United Nations Disarmament Commission, verbatim record of the 56th meeting, September 7, 1955.

The French plan also envisages a system of severe penalties for countries which attempt to falsify their budgets and awards to countries which declare their budgets correctly. Falsification of budgets could be detected, according to the French expert, Jules Moch, because it would not be possible for a nation to falsify one expenditure without also attempting to mislead in others.[23] The inspectors would have opportunities to detect the deception, in some cases by close scrutiny of the figures themselves and in other cases by analysis of the various economic activities within a country including its purchases of raw materials.

A number of problems arise in considering budgets as a device to control armaments. One already referred to is the need for a common definition of what constitutes military expenditure. Examples of the lack of a common definition are: (1) In one nation war pensions will be included in military expenditure; in other nations a different category will be used. (2) Military police sometimes are listed as military, sometimes as civil. (3) A railway line under construction exclusively for strategic purposes can be classified as public works or defense. (4) Nuclear power reactors can be classified as peaceful facilities because of the electrical power produced, or as military facilities because of the plutonium or weapons material produced.

A second problem concerns types of governments. Some governments are highly centralized, others very decentralized. This raises the question of whether all local budgets must come under the review of the inspectorate. If so, such a system could be extremely complicated and costly to carry out. Governments also vary in their budgetary practices. Some present very detailed budgets while others devise them very generally, using only broad headings to cover thousands of items.

Many governments have industrial contracts for defense. If the inspectors were permitted to check the books of private companies it might be considered as undue interference in a company's affairs.

A fourth problem is whether the limitations on defense expenditures should be qualitative or quantitative. If the latter, a country could reduce its expenditures in one area of defense and increase them in others through effective economy measures. Also, wage and price fluctuations would enable a country to change its budgets without necessarily reducing armaments, although the French believe that coefficients can be applied to allow for such variations from one year to another to give a constant value to the monetary unit concerned.[24]

4. Control of research and development

It is assumed that any system for control of research and development activities would be confined to those activities connected with military uses. Even in the case of control of atomic energy it will be noted that the draft statute of the proposed International Atomic Energy Agency envisages that functions of the Agency would be to assist and encourage research, to help members to obtain necessary materials and to assist in the exchange of scientists and scientific information in the field of peaceful uses of atomic energy. Actual control

[23] Ibid.
[24] Ibid.

would be limited to making sure that fissionable material would not be used for military purposes, and this control could be exercised by retrieving for deposit with the Agency reactor byproducts suitable for making weapons.[25]

It is hardly conceivable that research would be prohibited under any system of control on the grounds that the end product might have some military value. Had that been the case in the last few decades, consider the effect it would have had upon such useful machines as the radio, telephone, automotive vehicle, airplane, and radar, to mention a few. The present intensified research and development which is in progress in the world in the field of long-range rockets is applicable either to the uses of war or peace. The problems in launching an earth satellite for the purpose of gathering geophysical data are similar to those of launching an intercontinental ballistic missile with a nuclear warhead. Research in the field of bacteriology for development of vaccines could be applied to the production of biological weapons. Such examples could go on and on.

If agreement were made at the political level to limit or monitor tests of weapons or other devices of a purely military nature, no insuperable technical problems are envisaged which would make it difficult to control such tests provided, of course, adequate provision were included for inspection. By agreement, future tests of nuclear weapons could be either prohibited or carried out under the aegis of an international agency. Unauthorized tests would be difficult to conceal.[26] The difficulty, from a technical aspect, would arise in determining, for example, whether a long-range rocket was part of a weapons system or a device designed to explore space. From a technical standpoint, attempts to differentiate between military and nonmilitary research and to impose control on research and development activities only in the former category would be, in general, impractical.

The foregoing conclusion raises the question of what should be done in the event of another scientific discovery of military significance. Such an event could conceivably give the discoverer a tremendous advantage, at least for a period of time, over other nations and would probably complicate the disarmament negotiations.

D. METHODS OF INSPECTION AND CONTROL

One of the principal purposes of the United States and others in disarmament planning has been to develop a system which will tend to reassure each nation that it is not in danger of attack, particularly a surprise attack, and that other nations are observing the arms limitation agreement. In view of the atmosphere of deep distrust which has developed, especially since the close of World War II, the creation of such a system has become most difficult since the element of good

[25] Congressional Record, April 25, 1956, op. cit., pp. 6187 and 6189.

[26] While there is general agreement that at least large bomb tests can ordinarily be detected even without international inspection arrangements information varies on the detectability of all tests. Mr. Stassen has said that every explosion cannot necessarily be detected, Subcommittee hearings, op. cit., pt. 1, p. 22. Commissioner Murray of the Atomic Energy Commission has testified that we have very accurate means of determining the size of tests that are carried on throughout the world. Ibid., pt. 6, p. 362.

faith has so much bearing upon the outcome of the venture.[27] As it is presently being considered, a workable system of control involves three main features: provision for exchange of military information, an inspection system, and a plan for enforcement of the disarmament agreement or some kind of action in the event the inspection procedures raise suspicions or produce definite evidence of a violation of the agreement.

1. Exchange of information

One step in control is the exchange of military information or "blueprints," as the President has termed it. This could be relatively simple from the technical aspect, though admittedly involving much work by many individuals. Difficulties would be more likely to appear in the process of arriving at agreement as to the extent, manner, and timing of the release of secret information affecting national security; for instance, the size of nuclear weapons stockpile. In the United States, the President's proposal suggests the need to review our laws pertaining to the disclosure of information affecting national security and our treaty obligations with respect to disclosure of defense information jointly held with other countries, such as members of NATO. An especially delicate point would be the release of information regarding United States forces stationed at oversea bases where such release might involve information bearing on the base itself and would therefore bring up the question of concurrence of the host country.

If the exchange of military information is carried out as envisaged by the United States, each participating nation should have a reasonably accurate estimate of the military capabilities of the other participants. This would mean having all of the information required to form a true estimate of the size of the forces, their organization, equipment, state of training, logistic system, status of reserves, replacement system, and mobilization potential. It would also require information as to the deployment of these forces, including order of battle information, notice of intended troop movements, station lists, armament programs, military budgets and expenditures, census of armament and personnel, and rotation plans. This type of information can be assembled and verified. Given enough time and trained personnel and free access to the necessary records and military installations, an inspection team could make an accurate comparison of information provided with the actual status of the military establishment. This, however, would not hold true in the case of unconventional weapons since, as has been previously pointed out, stockpiles sufficient to gain a strategic decision could be hidden beyond present likelihood of detection.

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[27] While this staff study is limited to outlining the technical problems involved in establishing a working disarmament system, the United States has eight task forces composed of eminent specialists in their fields who are extensively studying the requirements and methods of effective international inspection and control. The President's special assistant on disarmament had this comment to make on the work of these task forces:

"As a result of their studies, and in connection with the President's plan, I believe we shall have something we have never had before—a detailed operating manual of what to inspect, how and where it would be inspected, and a knowledge of what can and cannot be profitably inspected if we seek to provide a safeguard against surprise attack and to supervise an international arms limitation agreement. * * * The problem is the kind of inspection you would want on the other side, and that you would reciprocally accept within the United States, and that in itself is a complex problem." Subcommittee hearings, op cit., pt. 1, pp. 11, 12.

Recent disarmament proposals of both the Soviet Union [28] and the United States [29] acknowledge, in effect, the present inability to detect hidden nuclear weapons. Whether any disarmament system should be undertaken in the absence of technical means of verifying the status of the unconventional weapons stockpile of other member countries, is, of course, a political decision. It should be borne in mind, however, that until long-range ballistic missiles have been perfected, there are means now in existence for checking on the delivery systems for these weapons.

After agreement has been reached as to details and extent of information to be exchanged, the timing and mechanics of the exchange must be determined. Fear would exist in each country that it might find itself in the position of having released important or vital defense information without receiving in exchange an adequate quid pro quo. Two safeguards could be instituted to deal with such a possibility. Before any information is exchanged, the control machinery for handling such information could be not only existent but ready to function. Secondly, information could be disclosed on a step-by-step basis. The first increment could cover conventional arms and forces and could be quite complete without undue risk to any country since most of the information would already have been obtained either by overt or covert means. Subsequent disclosures of more vital information, especially that pertaining to advanced weapons systems and nuclear stockpiles, might be deferred until assessment was made of the results of the first exchange and of the political climate existing at the time.

2. Inspection

President Eisenhower and, among other officials, Secretary Dulles and Mr. Stassen have emphasized the necessity for establishing a satisfactory inspection system before the United States moves to any great degree in the direction of disarmament. Secretary Dulles has expressed his personal view that it would not be possible to achieve a system of mutual inspection and control 100 percent mechanically complete but that, if the risks could be reduced to small enough proportions, these risks might be balanced against the serious risk otherwise resulting from an arms race.[30] Secretary Wilson believes that an inspection system is important because it would reveal the attitudes of the parties. He said:

> It is like auditing the financial activities of a big corporation. Somebody may do a little local stealing once in a while, but you can tell whether the thing is right or not. * * * [From] my point of view, this inspection system is simply to assure each party that the attitudes of the other parties continue to be proper.[31]

Any inspection system would contain these risks: Failure to achieve adequate inspection coverage, to assess accurately the significance of observations made during the inspection process, and to make prompt, trustworthy, and full reports of inspection results.

The handling of reports and, to a large degree, the correct interpretation of observations made during inspections are matters to be con-

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[28] Collection of Documents, op. cit., pp. 385–392; and Frye, William R., Christian Science Monitor, May 8, 1956, p. 1.
[29] United States Draft Working Paper for the First Phase of a Comprehensive Agreement for Disarmament, submitted before the U. N. Disarmament Subcommittee on April 3, 1956.
[30] Subcommittee hearings, op. cit., pt. 2, p. 54.
[31] Ibid., pt. 4, p. 177.

trolled by proper selection, training, and management of personnel. To accomplish inspections on a base broad enough to meet the critical needs of national security would mean making an agreement that would give the inspectors full authority to inspect without hindrance.[32] They would have to be permitted, within the fields agreed upon as subject to inspection, to proceed with their work at such times and places and in as much detail as they chose. The agreement under which they acted would need to be clear, precise, and detailed.

Considerable difficulty can be foreseen, so far as implementing the agreement in the United States is concerned, in determining how far inspectors might be allowed to go in covering private industry, transportation, utility and communications systems, research laboratories, and similar institutions having any connection with defense work. Manufacturers are especially zealous in protecting their trade secrets and the question arises of how inspection might intrude into the field of trade secrets or technical know-how. This type of inspection would undoubtedly be considered by many as an invasion of their right to privacy.

Both the Soviet Union and the United States would certainly find some difficulty in reaching accord as to how deeply they would allow inspectors to probe into their highly secret weapons systems, communications centers and emergency systems, technical and scientific processes, and strategic weapons stockpiles. Another complication might be that of obtaining the consent of host countries, where we have foreign military bases and installations, for inspection by parties of other governments, in the event these bases were included in an inspection system. Even though these inspections were limited to United States installations and forces, local sovereignty would be involved, and the host countries might not be parties, at least initially, to the disarmament agreement.

Inspections could be made by air reconnaissance, by actual visits to strategic or suspected areas, or by a combination of both. The United States has stressed the importance of aerial inspection as a means of allaying the fears and dangers of surprise attacks.[33] The Soviet Union, on the other hand, has expressed reservations as to the aerial inspection plan and has tried to show that a system of control posts at strategic points would be preferable.[34] The advantages of aerial inspection lie, first, in the vast areas which can be photographed in a relatively short time by jet planes flying at very high altitudes and using the newest photographic equipment.[35] Second, the equipment and personnel to do the photographing are already available, at least in the United

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[32] Slessor, Sir John, Air Power, vol. 3, No. 1, October 1955, p. 5. Marshal of the Royal Air Force Slessor says, "A system of control and inspection to be absolutely 100 percent cast-iron-proof against bad faith would mean that the agents of the international control organ would have to be free to go literally anywhere they chose." He added that he doubted if this would be acceptable to the British, Americans, or Russians in the immediately foreseeable future.

[33] Department of State Bulletin, August 1, 1955, pp. 173–174.

[34] Ibid., October 24, 1955, pp. 645–646.

[35] U. S. News & World Report, August 5, 1955, p. 73. Mr. Sherman M. Fairchild, chairman of the board, Fairchild Camera & Instrument Corp. has estimated that, on the basis of 1 RB–47 photographing 4,000 square miles an hour, 34 RB–47's could photograph the 8.5 million square miles of Soviet Russia in 30 days of clear weather; however, it would probably take a year to find 30 days clear enough to do the task.

Subcommittee hearings, op. cit., pt. 1, p. 7. Mr. Stassen estimated that it would take less than 6 months to photograph the Soviet Union, allowing for weather.

Subcommittee hearing, op. cit., pt. 5, p. 289. Dean Duncan E. MacDonald, Boston University, estimated that it would take about 200,000 photographs for overall coverage of the U. S. S. R. and another 200,000 for additional closeup coverage of selected areas.

States, though many additional skilled workers would be needed for photographic interpretation. Third, much spot checking would be used after the first broad coverage since the first inspection would disclose many areas where military activity would be unlikely. Aerial inspection would draw heavily on the highly developed techniques of aerial photography, but even these have their limitations. A major disadvantage of aerial inspection is the impossibility or difficulty of checking activities in covered or hidden areas, movements at night or during periods of low visibility, and movements of submarines, any of which might involve nuclear missiles, and the problem of differentiating between routine training maneuvers and preparations for attack. Ground inspections, while unable to cover large areas in the time and at the relatively low cost of aerial inspections, would be needed as a complement to the latter to cover "blind spots."

3. Personnel for inspection duty

Whether inspections would be made from the air, on the ground, or by both methods, one of the major problems would be to find and train the necessary personnel and to organize their activities in such manner as to permit them to do their work effectively, yet to avoid unpleasant incidents arising from working contacts. The control agency for making inspections might be set up as a bilateral agency, or as a multilateral body drawing its personnel from the participating countries. In the latter case, it would not be realistic to expect that either the Soviet Union or the United States would be satisfied to rely entirely upon personnel from other countries to make their inspections. With national security so deeply involved, the Soviet Union could be expected to insist upon having a substantial number of its own nationals take part in any inspection involving United States military installations, and the United States would take the same attitude regarding the U. S. S. R.

So far as conventional weapons are concerned, both the United States and the Soviet Union undoubtedly have sufficient skilled personnel in their own armed services who could be trained quickly to make ground and aerial inspections, except in the matter of photo interpretations. In the United States, and this would also probably be true in the Soviet Union, initially taking a large corps of inspectors and photo interpreters from the armed services for this duty would introduce a collateral problem of replacing these men in their military occupations. An eventual cutback in military strength would not entirely solve this problem because many of those released in the cutback would not be suitable for inspection duties. Also, it would be in the interest of achieving smooth and efficient working arrangements if the inspection system were fully prepared to operate before any disarmament steps are taken. This is provided for in the United States draft plan.[88]

Personnel for inspection of nuclear-energy installations and activities would present a more difficult problem, at least in the United States. When asked if the United States Atomic Energy Commission (AEC) would be in a position to supply a sufficient number of technically trained ground inspectors to determine with a high degree

[88] United States Draft Working Paper op. cit., sec. III, par. 18, p. 7; also Welles, Benjamin, New York Times, April 4, 1956, p. 1.

of certainty that the Soviets were not concealing atomic weapons, Chairman Strauss replied that the AEC has less than 4,000 employees of all sorts. The bulk of the atomic energy program is conducted by the employees of contractors. If the contractors' employees were used, the program as presently carried on would suffer. He said it would therefore be necessary for Congress to provide the means for the AEC to obtain and train the necessary people outside of the existing program.[37]

Personnel to be selected for inspection work would need to be screened most carefully, not only as to their integrity and professional competence but also as to their ability to do their work under adverse conditions. The experience of Allied inspectors in Germany following World War I has been previously mentioned. In light of the atmosphere of deep distrust which has conditioned the thoughts of citizens of Soviet Russia and the United States about each other for many years, it cannot be expected that the operations of the inspecting personnel, particularly the ground inspectors, could be carried out without the possibility of friction at working levels. Regardless of how cordial relations might be at top levels, the success of an inspection system would, to a very large degree, rest on the ability of the inspectors to do a thorough job; this could be next to impossible if the attitudes of the inspectors were such as to aggravate the suspicion and ill feeling inherent in the situation, especially among the employees of private companies working on military contracts and, therefore, presumably subject to some degree of inspection.

The United States has proposed setting aside nonsensitive demonstration areas in the United States and the Soviet Union "to facilitate the study and negotiation of a disarmament agreement." [38] The Soviet Union has suggested demilitarization of Germany, which, if agreed, might provide an opportunity to give inspectors actual field training. A proposal made to the Senate Disarmament Subcommittee was that the United States arrange for a practical tryout of an inspection plan with some friendly country.[39] This plan has the merit of not requiring approval by the U. S. S. R. and thus it could be put into operation at an early date. The experience of meeting and solving the unexpected as well as usual problems sure to arise would give the United States invaluable data and experience for later use; however, some experts consider that lack of realism would detract from the benefits which might be expected.

4. Inspection coverage

The purpose of inspection under a disarmament system, as now being considered, would be twofold: to prevent surprise attacks and to verify the progress of disarmament under an agreement. Frequent checks to discover mass movements or concentrations of conventional forces or the accumulation, at campaign levels, of such supplies as gasoline and ammunition behind possible points of attack, would give warning of the possibility of an attack by such forces. Getting evidence or warning of an attack with mass destruction weapons poses a much more difficult problem. Since it is technically

[37] Subcommittee hearing, op. cit., pt. 3, p. 131.
[38] United States Draft Working Paper, op. cit., sec. 11, par. 2, p. 2.
[39] Subcommittee hearings, op. cit., pt. 5, p. 245.

impossible to detect nuclear weapons which have been deliberately hidden, warning of an attack with these weapons would have to come from observation of the means of delivery. This would involve checking movements of aircraft (including civil aircraft) capable of delivering the weapons; of naval vessels, both surface and submarine, which might approach shores closely enough to launch missiles with nuclear warheads, also other ships which conceivably could detonate nuclear bombs in harbors or along coastlines with resulting devastation and dangerous irradiation from fallout; and, finally, it would involve checking known missile launching sites. If and when long-range ballistic missiles are perfected, it must be expected that means of launching them will also have to be devised. There is general agreement that present techniques of inspection against surprise attack would be inadequate in the event of the stockpiling of intercontinental ballistic missiles.

Some conception of the magnitude of the task of carrying out inspections may be gained from a consideration of what should be looked at and at what intervals. These, generally speaking, would fall into the following categories: [40]

(1) Armed forces: Strength, structure, equipment, and deployment.

(2) Weapons and delivery systems suitable for surprise attack.

(3) Transportation and telecommunications facilities.

(4) Manufacturing facilities for military equipment and armaments, including chemical and biological weapons.

(5) Logistic supply systems.

Specifically, this would involve inspections and spot checks of such diversified items as these:

(a) Military installations: Posts, camps, and stations; air and naval bases; depots; warehouses (both owned and leased by the military); armories (National Guard, Reserve, and ROTC); naval and merchant marine anchorages (mothballed ships); testing areas; launching sites for missiles; training areas; air and sea ports of embarkation and debarkation; communications centers; radar stations; repair and maintenance facilities; oil and ammunition storage.

(b) Transportation facilities (other than military facilities included in (a) above): Freight terminals, classification yards and loading-unloading facilities for railroads, trucking lines and airlines; oil pipelines; air and sea port facilities.

(c) Manufacturing facilities: Arsenals, tanks, and other heavy equipment; shipyards; airframes, engines, and missiles; signal and electronic equipment; explosives and propellants; chemical and biological weapons; power generating and distribution systems; sources and stockpiles of strategic raw materials; nuclear reactors and installations; machine tools for military production; component parts vital to certain equipment, e. g., timing devices.

(d) Intangible items: Military budgets and expenditures; legislation and orders affecting the military; agreements for support of military establishments of other countries.

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[40] Nutting, Anthony, Vital Speeches, vol. XXI, No. 24, October 1, 1955, p. 1511; also, U. S. News & World Report, September 9, 1955, p. 106, and United States Draft Working Paper, op. cit., sec. III, par. 7 (a), p. 5.

An important objective of the inspection process from the United States viewpoint is to prevent surprise attacks. It follows that inspection teams would need their own communications systems for reliability in transmitting information of ominous nature. It also follows that such a communications system would need to be foolproof against jamming if national security is to rest upon its reliability.

5. Enforcement

What would happen if the inspectors should some day find evidence indicating failure to keep an agreement, possibly of a menacing nature? It has been pointed out that the Communists could decide to sabotage an arms-control plan, as they often have other international agreements, by tactics short of formal breaches but, in effect, sufficient to balk the inspectors.[41] Each instance would need to be decided on a case-by-case basis. If the violation were of a minor nature, the decision might be to overlook it or to bring it to the attention of the offender by a diplomatically worded note. If the violation appeared willful and threatening, the redress might conceivably include resort to international legal proceedings, escape clauses, and sanctions of various forms.

An international police agency might be effective against smaller nations. Among the great powers themselves, however, this concept runs into the reality that in the present context of world organization they would naturally have contributed forces to such a police group, and it is unthinkable that any country would make any armed force available for use against itself. Enforcement of a disarmament agreement as between the most powerful nations depends either on self-policing on the part of these countries, the threat of reciprocal violation of the agreement by other parties to the agreement, or international suasion, short of acts of war, in some form. The alternative, the direct use of force by a nation or a coalition of nations against a great power which had failed to keep a disarmament agreement would bring about the very situation which the agreement was designed to prevent—war.

E. PROBLEMS RELATING TO REDUCTION OF ARMED FORCES

Constructing a formula for limitation of armed forces which will be acceptable to all parties means that a searching analysis must be made of the requirements upon which the forces of each country are based. Military strength is not measured by the simple process of taking an inventory of men, equipment, weapons, and supplies. Important factors such as the state of morale and training of the troops and the modernity of their weapons must be calculated; also, the industrial potential for backing up the armed forces, transportation facilities for moving troops and their logistic requirements, and communications facilities for command and control of the armed forces complex. Actual military strength also depends upon the ability to bring a force to bear at the time and place and in the numbers necessary to win the battle. Thus, a country might hold the largest stockpile of nuclear weapons in the world but actually be very weak because it did not have the means of delivering these weapons on the targets for which they were designed.

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[41] Cavers, David F., Foreign Affairs, vol. 34, October 1955, p. 64.

1. Definition of "balanced forces"

Another important factor to be considered is the state of balance between, as well as within, the respective forces. By "balanced forces" is meant those which have been so organized, trained, and equipped that each force can carry out its part of the overall mission in the most effective and efficient manner. This means that each force must have the necessary strength and means to accomplish its mission but that there will be no unnecessary duplications between forces and that no single force will be topheavy with unneeded strength. The term balanced forces implies a degree of interdependence between forces; that no one force will try to be self-sufficient in all fields but will look to the other forces for support in the fields which are the primary responsibilities of those forces.

It could not be expected that the parties to a force-reduction agreement would accept a status which would leave them relatively inferior to that which they held before the agreement became effective. In other words, reductions are likely to be approved only if they leave the parties with the same relative strength as they had before the cuts were made. This factor militates strongly against a procedure of considering different weapons separately and trying to set acceptable ceilings in each case. It suggests that a more fruitful procedure involves simultaneous consideration of all weapons or weapons systems in the same category, together with the weapons or threat which the category was designed to counter.

As an illustration, assume that the submarine were to be considered for the purpose of setting ceilings on it as a weapon. The Soviet Union has a submarine fleet much larger than the United States submarine force. If a proposal were to be made that each country should cut its submarine strength by a given percentage, a likely reaction would be that the Russian submarines constituted a defense against the United States overseas bases which the Russians consider a threat against their country. This would then bring up the question of why the United States had thought it necessary to build these bases; in other words, there would probably ensue a full-scale consideration of all the factors which had led to the buildup of the Russian submarine fleet and the creation of the United States overseas bases. These considerations would be more political than technical, which is likely to be the case in all arms-reduction negotiations. It is most difficult to separate the political aspects from the technical, but there must be a measure of political accord before the technical experts can know where to begin cutting and how deeply they can go.

Another problem which would have considerable significance in the United States would be that of obtaining concurrences from the three services as to where reductions should be applied. With a relatively liberal budget to be split three ways, we have seen the difficulties which have arisen in getting Army, Navy, and Air Force agreement. As the forces were reduced, service feelings would be intensified in this regard.

Some past experiences in trying to bring about reductions in armaments are enlightening. At the Washington Conference for Limitation of Naval Armaments, held in 1921–22, the British proposed the abolition of the submarine.[42] Such a proposal was understandable,

[42] Latimer, Hugh, Naval Disarmament, Royal Institute of International Affairs, London, 1930, p. 9.

considering the frightful damage which the British had suffered from German submarines during World War I. However, the proposal was not accepted; it was argued that the underseas boat was useful for scouting as well as a weapon against combatant naval vessels. Had it been outlawed, this would have been considered as of special benefit to the British whose very existence was dependent upon her long trade routes. Again, in 1927 at the Three Power Naval Conference at Geneva, the British, Japanese, and the United States tried to reach agreement as to the permissible size of cruisers. Great Britain had 80,000 miles of trade routes to patrol and wanted a large number of 6-inch gun cruisers for commerce protection. The United States and Japan were more interested in heavy cruisers with 8-inch guns and long range of action, since neither had a wide network of naval bases for refueling and servicing the smaller cruisers as did Great Britain.[43] The Conference failed to reach agreement because, as one of the British delegates said later:

> We could not find a formula which could equate ships mounting 8-inch guns with ships mounting 6-inch guns. * * * The reason for the breakdown of the Conference was that, although we agree on equality, we could not find a formula for it.[44]

Sir Winston Churchill, at that time Chancellor of the Exchequer, said shortly after the close of the Conference:

> The fundamental course which prevented agreement lay in the different views of what constitutes naval equality by the Americans and ourselves. * * * Therefore, we are not able now—and I hope at no future time—to embody in a solemn international agreement any words which would bind us to the principle of mathematical parity in naval strength. * * * The doctrine of naval equality, if it is to be accepted by us, must take into consideration the whole position of the two countries on the sea, and their respective risks and vulnerability.[45]

A reduction in actual numbers of troops or in certain categories of weapons does not necessarily mean a reduction in the real overall military strength of a nation. If the reductions consisted of troop units which were surplus to the strategic and tactical needs of the country, that is, units which could not be brought to bear effectively during combat, the armed forces of that country could well be strengthened by such a reduction, through the simple process of diverting the efforts and expenditures from maintenance of these unprofitable forces to modernizing the remaining forces. The same would be true of retiring or scrapping out-of-date weapons, aircraft, and naval vessels. It is perfectly possible, therefore, that the reductions in troops announced by the U. S. S. R.—640,000 announced in late summer 1955, and 1,200,000 in May 1956—would when completed leave the Soviet military strength even greater than before the reductions were made. This would almost certainly be true if the cuts were made in connection with a modernization program that would result in bringing the forces into balance and in increasing the potential for manufacture of armaments by taking men not needed in uniform and putting them to work in factories.

One other weakness exists in connection with reliance upon reductions in numbers of troops to accomplish a lowering of military strength. There are many jobs in the military which can be handled acceptably by civilians, especially in the logistics field. A sizable re-

[43] Ibid., pp. 32–48.
[44] Ibid., p. 45.
[45] Ibid., p. 47.

duction in military force could be made by a country with little if any diminution of military strength by the expedient of replacing the troops in certain logistics fields with civilians, perhaps by the same personnel changing from military to civilian status.

2. Influence of timing on limitations and reductions

Failure to limit the use or manufacture of nuclear weapons soon after the end of World War II has made it technically infeasible, perhaps impossible, to apply such limitations under present conditions. A similar situation may be shaping up with regard to the intercontinental ballistic missile (ICBM). Unless prompt measures are taken to adopt some workable plan for the limitation of development of this weapon, or for an effective control, some country is quite sure, within the relatively near future, to complete a successful test of an ICBM. Once a country has made such a test, even if the missile were to be outlawed immediately thereafter, that country would have a very great and significant advantage over other countries. It would mean that, in the event the disarmament agreement were dissolved or broken, the country having completed the test and having carefully preserved its research and development data could go into production of the weapon far ahead of any other countries.

In a complex weapon of this nature, it would be unthinkable to enter production before the many technical obstacles and difficulties, especially those concerned with guiding the missile to its target, had been solved by thorough testing. From a technical aspect, therefore, if there is to be agreed international limitation or control of ballistic missiles or other new weapons of similar destructive power and advanced scientific or technological concept, it appears important that such control or limitation be made effective before their originators have had the opportunity to perfect them.

Timing as to reductions in forces, bases, logistics systems, and conventional weapons or weapons systems, poses a very different kind of problem. It is assumed that the disarmament planners would have to be concerned with a phasing of cutbacks which would maintain the relative strengths of the negotiating countries while the reductions were being made. This would require a timing plan which would not only provide for phasing out certain personnel and weapons on certain dates but would also take into consideration the need for simultaneous cutbacks in forces, weapons systems, or installations, in different categories, perhaps, but matching each other in strength and with some relation as to purpose. If all countries considering an arms control plan used their submarines for scouting and combat against warships, it might be relatively easy to agree upon a reduction, but where these undersea boats are used by nations for different purposes, any reductions should bear some relation, as to timing, to comparable reductions in the weapons or forces which the submarines were designed to counter.

F. CONCLUDING OBSERVATIONS

1. Need for political accord

If a disarmament plan is to succeed, that is, if it is to enable participating countries safely to reduce their armaments and armed forces, the plan must carry with it some positive means of inspiring interna-

tional confidence. So far as the United States is concerned, the fears of its citizens center largely around possible surprise attacks. It will be a long time before the shock and the lesson of Pearl Harbor are forgotten. The United States has sought to find the answer to the danger of surprise attack in the establishment of an effective, dependable inspection and reporting system. However, before the technical problems connected with setting up such a system can be solved, there must be some political accord as to the objectives to be sought. Without firm guidance in that respect, those who are charged with working out the technical details of armaments control cannot hope to reach any real agreement in the more sensitive fields, as for example, the latitude to be allowed inspectors in delving into the hitherto sacrosanct secrets of government and industry pertaining to defense.

There would also need to be political accord as to the scope of participation in the disarmament agreement. From the point of view of the technical expert charged with devising a safe plan it would be most unrealistic to engage in any important national disarmament process until assured that all countries having the capability of seriously threatening world security were safely under the umbrella of the agreement. This immediately brings to mind the question of Communist China and the problem of working out the technical details of a disarmament agreement with a government which the United States has not recognized. This is another example of the dependence of the technical experts upon political guidance in order to carry out their responsibilities.

2. Limiting unnecessary inspections and reports

It would seem good judgment to limit inspection and reporting activities to those weapons, weapons systems, and forces which would be capable of bringing about a battlefield decision. Much valuable time could be wasted in accounting for the number of pistols held in the armed forces of a nation. After the information was reported, of what value would it be? Such weapons would bear little influence on the outcome of a war under modern conditions. Some earlier disarmament plans carried detailed annexes designed to get complete information on everything military, but the trend in later working papers is to eliminate the unimportant items for reporting. There is likely to be difficulty in obtaining enough skilled inspectors to cover the more important military items, making it doubly important that they not be wasted on nonessential activities.

3. Avoiding clashes at the working level

Any inspection system which would require a group of foreign nationals to have relatively free access to a large segment of the manufacturing, transportation, and communications processes of a country involves major considerations affecting the national sovereignty of that country. Although an inspection system of that kind might be accepted by a government as being in the best interests of the nation, there is no assurance that those at the working levels who would be dealing at firsthand with the foreign inspectors would welcome what they might consider as unwarranted interference with their daily work. Numerous unpleasant incidents might occur unless two steps were taken to avoid such happenings: First, careful selection and training of inspection personnel; and, second, an intensive campaign to educate personnel in factories, airlines, railways, and communica-

tions systems who would be most likely to come into close contact with the inspectors. Fewer difficulties are foreseen in the relations between inspectors and military or government personnel since the latter would, presumably, have been thoroughly briefed and instructed as to the importance of making the disarmament process work, and would be subject to greater disciplinary measures.

4. Personnel of inspection teams

Regardless of what kind of a control system might be adopted, inspection teams would probably need to include some personnel from the major nations. No matter how friendly, capable, and reliable nationals of third countries might be, nations are likely to insist that their security interest in a matter of this kind is too great to entrust to others. Since much of the value of the inspection system would lie in having an opportunity to assess the attitude toward disarmament on the part of the country being inspected, this is the type of information which would need to be acquired firsthand, particularly because of its intangible nature.

5. Influence of timing on ICBM control

In the absence of technical means for discovering hidden stockpiles of nuclear, chemical, or biological weapons, any disarmament system which called for abolition or reduction of weapons of this category could hardly be adequately controlled under present-day conditions. Failure to stop production of atomic bombs in the early days following World War II has led to an arms race which is about to be duplicated in the case of the ballistic-type missile. Once a nation has made a successful test of such a weapon, other countries will not rest easy until they, too, have the capability of making the weapons.

6. Chemical-biological-radiological weapons

It is very noticeable that in all current considerations having to do with disarmament, most of the concern is with mass destruction weapons of the nuclear type and their delivery systems. Little notice has been taken of other deadly types, particularly chemical and biological weapons. It is almost as though there were some kind of tacit understanding that, while countries might conceivably destroy each other with nuclear bombs, they would never contemplate using these other devastating weapons. The present-day interest in nuclear warheads and long-range missiles is a natural result of the postwar emphasis on these weapons, but any program for reduction or limitation of armaments and any inspection system would need to take cognizance of these other deadly weapons and make provision as well for many types of mass destruction or highly effective weapons which have not yet been developed or, perhaps, even conceived.

7. Reductions on overall basis

If the time comes to begin actual reductions in strength under a disarmament plan, these reductions will need to be undertaken on the basis of a broad study of the overall military strength and capabilities of the participating countries. Quantitative reductions are too easy to evade, as for instance, the substitution of civilian for military personnel in certain jobs, or the substitution of one kind of weapon for another. In computing the strengths of the countries concerned, it will, of course, be important to bear in mind the legitimate needs of the respective countries for internal and external security.

GLOSSARY

Arsenal—A plant devoted to the manufacture or storage of arms or ammunition.
Atomic weapon—According to the Atomic Energy Act of 1954, "any device utilizing atomic energy, exclusive of the means for transporting or propelling the device (where such means is a separable and divisible part of the device), the principal purpose of which is for use as, or for development of, a weapon, a weapon prototype, or a weapon test device." Atomic energy is defined as "all forms of energy released in the course of nuclear fission or nuclear transformation." Technicians use the term "atomic weapon" to refer to a nuclear weapon which depends for its effect upon the energy released by atomic fission, as opposed to atomic fusion.
Balanced forces—See text, page 19.
Biological warfare—Use of disease-spreading micro-organisms or toxins against an enemy; it includes bacteriological warfare which relates only to use of bacterial agents.
Blueprint—As used herein, a blueprint of military establishments consists of the identification, strength, command structure, and disposition of personnel, units, and equipment of all major land, sea, and air forces, including organized reserves and paramilitary; and a complete list of military plants, facilities, and installations with their locations. (*See* Order of battle.)
Camp—A military post of temporary nature used for quartering, training, or staging troops.
Chemical warfare—The use of chemical agents against the enemy. In this study, only lethal chemical weapons are classified as unconventional. Nonlethal gases, such as tear gas, and smoke and incendiaries are classed as conventional weapons.
Conventional weapon—See text, page 1.
Deployment—As used herein, it refers to the disposition of United States Armed Forces in various areas of the world to meet national commitments and to guard against threats to the United States or its allies.
Depot—A storage and distribution center for supplies or a processing center for personnel replacements.
ICBM—Intercontinental ballistic missile; a rocket-type missile with a range of about 5,000 miles, which has a velocity of 3 to 4 miles a second, travels at an altitude of several hundred miles and carries its own oxygen supply (as distinguished from air-breathing missiles) for fuel combustion.
IRBM—Intermediate range ballistic missile; smaller version of the ICBM, with a range of about 600 to 1,500 miles.
Mass destruction weapon—See text, page 1.
Military—Used as a noun, it refers to the armed forces collectively.
Nuclear material—Material capable of releasing substantial quantities of energy from nuclear fission or nuclear transformation.
Nuclear weapon—A weapon utilizing the force released in the course of a nuclear transformation, either fission or fusion. *See* Atomic weapon *and* Thermonuclear weapon.
Order of battle—The identification, strength, command structure, and disposition of the personnel, units, and equipment of a military force. (*See* Blueprint.)
Post—A military location at which troops are stationed.
Radiological warfare—Use of radioactive materials, or of methods resulting in production of radioactivity, against the enemy.
Station—A general term referring to any ground, naval, or air activity of military nature at a fixed land location.
Station list—A complete list of all military units and the stations at which they are located.
Strategy—The overall or master plan by which objectives of national policies are to be secured. National strategy includes the use of political, economic, psychological, and military resources. Military strategy is confined to the use of the armed forces to secure objectives of national policy, either by use of or by the threat of force.
Tactics—The employment of units in combat; in other words, the method by which strategy is implemented.
Thermonuclear weapon—A nuclear weapon depending upon the energy released by the fusion of atoms for its effect. The hydrogen bomb is of this type.
Unconventional weapon—See text, page 1.

DISARMAMENT AND SECURITY IN EUROPE

STAFF STUDY NO. 5

DECEMBER 11, 1956

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PREFACE

By Senator Hubert H. Humphrey

The recent events in the Middle East and Eastern Europe have thrown into a vastly different context efforts at the control and reduction of armaments. In Hungary we have seen a massacre of innocent people who desired freedom and sought to rid themselves of the yoke of oppression. In the Middle East we have seen nations use force in an attempt to solve complex international problems. In both cases, the use of force was shown to have distinct limitations. In one instance these limitations were largely moral, growing out of world opinion. In the other, they were largely practical, growing out of the fact that force is not completely effective in the face of passive resistance such as a general strike. Attempts at arms control must now be evaluated to determine whether they apply to the present world situation.

With respect to the situation in Europe, I believe Staff Study No. 5: Disarmament and Security in Europe, will serve as a very useful guide. The study focuses on the past and present security systems developed in Europe. It gives us pertinent facts about the defense structure built by the members of the North Atlantic Treaty Organization as well as an accounting of the so-called security system of the Soviet bloc. The study gives much of the background necessary for determining the future role of NATO in the defense of Europe and the extent to which new proposals on disarmament and security in Europe are likely to be successful.

In our continued review of the European situation, three questions must be kept in mind: First, to what extent can the nations of the North Atlantic Treaty Organization maintain a unified approach to the problems of Europe and to the problems in other parts of the world with which they are intimately involved? Second, can the reunification of Germany be brought to fruition and under what conditions? And third, what is the future relationship of nations of Eastern Europe to the Soviet Union and to the western democracies?

Western proposals on European security and the control and reduction of armaments have always taken these three questions into account. New developments call for modified if not new approaches. Therefore, the question of the future of European security must be tackled with renewed vigor and understanding.

When I speak of new or modified approaches to disarmament and security problems I am not referring here to total and comprehensive plans. I am thinking of specific proposals for Europe that could be a beginning in the endeavor to evolve a new European security system, based on a limitation of armaments and armed forces in the area. Such a beginning could help to reduce tensions between the western nations and the Soviet bloc. It could help set patterns which might be applied on a wider scale.

One proposal which ought to be explored more fully in future negotiations is that of creating a geographical zone in which military equipment and manpower would be kept at a prescribed limit. Such a zone would act as a buffer between the Soviet Union and the Western Powers. An inspection system should be instituted to insure that armaments and armed forces permitted within the zone would not be exceeded. The United States, Great Britain, France, and the Federal Republic of Germany have each discussed the possibility of a demilitarized zone in Europe. The U. S. S. R. has also made general statements about such a geographical zone. The negotiations among the major powers on this point, however, have not reached the stage of implementing the proposal. More detailed discussions on the establishment of a demilitarized zone should be undertaken.

The study was prepared by Charles R. Gellner of the Foreign Affairs Division, Legislative Reference Service, Library of Congress, under the direction of the subcommittee staff. It does not necessarily reflect the views of the subcommittee or of any of its members.

DECEMBER 11, 1956.

DISARMAMENT AND SECURITY IN EUROPE

A. INTRODUCTION

Nations generally cannot be expected to reduce their armaments unless their security can be assured in other ways, or unless they believe that no serious threat to their security exists. In other words, disarmament depends upon security. Disagreement over whether disarmament depends on security or whether security depends on disarmament haunted the long debates on disarmament in Europe between the two world wars. Nevertheless, European states based their national policies during that period on the proposition that effective disarmament requires the existence of a substantial degree of security and that premise has underlain much of the disarmament negotiations since World War II.

There is a difference, however, between Europe now and Europe in the interwar period. After the first global conflict had subsided, Europe, including the United Kingdom, was still the center of world power. Russia lay shattered by defeat and revolution, and the United States aspired to be independent of international entanglements. In many respects "European" and "world" problems of security and limitation of armaments tended to be synonymous.

In the post-World War II era the center of power has divided and traveled in two directions—west to the United States and east to the Soviet Union. In terms of power alinement, Europe is now divided between an Eastern European Communist coalition led by Moscow, and the North Atlantic alliance in which the United States is the strongest partner. Moreover, the rise of many new states in Asia and the Pacific has further diffused world power. Security and disarmament questions are presently more truly of a global nature than they were 2 or 3 decades ago. In fact, the world has now grown so interdependent that any attempt to consider regional disarmament and security problems without also taking into account their global relationship would be a serious mistake.

Within this broad framework, however, there are natural and logical subdivisions. Defense arrangements such as those in the North Atlantic area and the Western Hemisphere are reflections of the regional character of certain security problems. On the European Continent the problem of security is particularly acute because there the fate of one of the most highly developed and strategic areas on earth is being contested.

This study concentrates on the alliances, the disarmament arrangements, actual or proposed, and similar devices through which the European quest for security has been carried on over the years. It shows the extent to which the security of the United States has become interlocked with Western Europe. The study also discusses the problem of the division of Germany and its relation to European

security and proposed disarmament plans. With the exception of Germany, the scope of the study does not include the various political problems which give rise to the need for armaments and which so drastically impede progress in their control and reduction. Nor does it encompass those negotiations for universal disarmament under the auspices of the United Nations, except for certain aspects that particularly concern Europe.

B. BACKGROUND

Concert and alliance before World War I

For a century before the First World War, wars in Europe were confined to two or only a few belligerents. There were no continent-wide conflagrations such as consumed Europe during the Napoleonic era or as was ignited in 1914. The causes of peace, as the causes of war, are difficult to analyze, but certainly key factors in stabilizing European tranquillity during the 19th century were, first, the Concert of Europe and then later, the system of balanced alliances.

The Concert of Europe sprang from the peace settlement of 1815 which followed the downfall of Napoleon. The continental powers of the time sought to arrange an "enforced peace" with a "positive guaranty" to suppress aggression backed up by an international army. But when Great Britain shied away from such a pledge, the powers then adopted the concept of "concert," involving no commitments other than to consult on common action in case of a threat to the peace.

In the latter part of the 19th century a system of alliances was created which overshadowed the concert system and dominated Europe until the First World War. The alliance system was based on a principle almost directly contrary to that of the concert, namely, that opposed groups of states could strike an equilibrium in which all could find security and peace. Actually the equilibrium was extremely precarious as was proved in 1914.

After World War I the approach to peace was reminiscent of 1815. Essentially the procedures of the League of Nations, like the earlier Concert of Europe, were consultative in nature, but more elaborate than those of its predecessor. The League members undertook to preserve each other's territorial integrity and political independence against external aggression, and if any member should go to war without resorting to procedures specified in the covenant for peaceful settlement of controversies, certain economic sanctions were to be automatic. Military penalties were discretionary.

In the covenant the League members recognized that the maintenance of peace also required—

> the reduction of national armaments to the lowest point consistent with national safety and the enforcement by common action of international obligations.

The League was to formulate plans for such reduction. No method of control by inspection was mentioned, but the members did promise—

> to interchange full and frank information as to the scale of their armaments, their military, naval, and air programs and the condition of such of their industries as are adaptable to warlike purposes.

German disarmament in the Versailles Treaty

After the First World War, European security was sought not only through collective League action but also by restricting the military power of the enemy states. Severe limitations were placed on the military establishment of Germany, and restrictions were also prescribed for the armed forces of Austria, Hungary, and Bulgaria in the treaties with those countries.

The French were not content, however, to rely for their national safety solely upon these measures. In subsequent years, through alliances with countries surrounding Germany [1] and by reiterating within the League the need for putting "teeth" into collective security, they constantly sought to construct a more airtight defensive cordon around their neighbor across the Rhine.

The Locarno spirit

Following an unsuccessful attempt to tighten up the League machinery of collective security through the abortive Geneva Protocol of 1924, the Western European nations concentrated upon easing tension in one of the most critical areas of Europe, the Franco-German frontier. In a group of pacts initialed at Locarno, Switzerland, on October 16, 1925,[2] they attempted to solve this question. The Locarno Pacts were greeted widely as the beginning of a reconciliation between France and Germany. By the Treaty of Mutual Guarantee, Germany, France, and Belgium pledged to regard their mutual frontiers and the demilitarized Rhineland as inviolable, and in no case to attack, invade, or resort to war against one another. All accepted a system of pacific settlement for dealing with disputes among themselves. Both Britain and Italy guaranteed these obligations and, in case of a violation, the signatories were bound to come at once to the aid of the victim. The test of the aggressor was the refusal to submit to the peaceful settlement procedures.[3]

The relief that accompanied the rapprochement between France and Germany and the admission of the latter into the League of Nations gave rise to what the publicists called the "Locarno spirit" and inaugurated an era of good feeling in Western European relations. For a few years relative tranquillity and stability settled upon the continent, but the era was short-lived.

A new threat to peace appeared after Hitler and the Nazis came to power in Germany in 1933. When Nazi Germany in 1936 repudiated the Locarno pledges, which had frozen the Versailles status quo, the guarantors did not back them up and Europe slipped steadily into the vortex of war. In the end the limited Locarno system of collective security proved no more efficacious than the general system of the League.[4]

[1] A treaty of alliance, signed June 28, 1919, by which Britain and the United States were to give France armed assistance in case of an unprovoked attack by Germany was never ratified by the United States and never came into effect. Treaties of alliance or friendship were subsequently concluded by France with Belgium (1920), Poland (1921), Czechoslovakia (1924), Rumania (1926), and Yugoslavia (1927).

[2] The Locarno Pacts were formally signed in December, 1925.

[3] The Treaty of Mutual Guarantee was also accompanied by four arbitration treaties between Germany on the one hand, and France, Belgium, Poland and Czechoslovakia on the other. Separate treaties were signed at the same time by France with Poland and Czechoslovakia pledging armed support against a German attack. All of the Locarno pacts were to come into force when Germany became a member of the League, which she did in September 1926.

[4] France attempted in 1934 to promote an "Eastern Locarno" but without success. One result of these efforts, however, was the conclusion of a Franco-Soviet alliance in 1935.

Disarmament between the wars

The respite furnished by Locarno gave the European nations an opportunity to deal with the disarmament problem. Late in 1925 the League established a Preparatory Commission for the Disarmament Conference, composed of representatives of the great powers, including the United States, and later Germany and the Soviet Union. It took the Preparatory Commission 5 years to produce a Draft Disarmament Convention, and the conference itself eventually convened in February 1932.

At the conference, Germany insisted upon equality of armaments and a lifting of the Versailles arms limitations. This claim to equality was eventually recognized in principle, but only after the Germans had threatened to abandon the conference. In January 1933, Adolf Hitler became Chancellor of Germany, and in October 1933, Germany withdrew from the Conference and the League of Nations. That was virtually the end of disarmament efforts in Europe, and within a year the rearmament race which was to culminate in World War II was underway.

C. THE DEVELOPMENT OF THE EUROPEAN SECURITY SYSTEM SINCE WORLD WAR II

European security as a regional problem

In planning for the security of the postwar world the United States and other major members of the coalition warring against Germany, Italy, and Japan placed great stress on organizing the United Nations with primary responsibility for maintaining peace. In doing this, however, the drafters of the charter—most particularly the United States and other American countries—recognized in article 51 that member states have the inherent right of individual or collective self-defense against an armed attack, pending action by the Security Council to take measures to deal with such an attack.

Even while these blueprints for the security of the world as a whole were being developed, however, leading European nations were taking additional steps to provide for the postwar security of the Continent. As early in the war as May 1942 Great Britain and the U. S. S. R. concluded a 20-year treaty of alliance which was directed against a recurrence of German aggression.[5] Two years later the governments of liberated France and the U. S. S. R. signed a similar pact.[6] Another 2 years elapsed before common concern over the future of Europe induced France and Britain to sign their first formal peacetime alliance at Dunkirk on March 4, 1947.[7] This treaty, although in its terminology directed at a recurrence of aggression by Germany, was concluded at a time when Soviet expansionist ambitions were becoming increasingly apparent.

In addition to these bilateral pacts directed against Germany another important development fostered a regional orientation for postwar European security. The United Nations was not given

[5] The text is in United States Senate Foreign Relations Committee, North Atlantic Treaty: Documents * * * (81st Cong., S. Doc. 48), 1949, pp. 104–106. Cited hereafter as S. Doc. 48.

[6] December 10, 1944. The text is in S. Doc. 48, pp. 106–108. At this time the drafts for the world security organization were reaching an advanced stage and Prime Minister Churchill explained to Marshal Stalin that "European arrangements for better comradeship" should be subordinate to the proposed world body. Message of November 25, 1944. Winston S. Churchill, The Second World War: Triumph and Tragedy, Boston, Houghton Mifflin Co. (1953, p. 255).

[7] The text is in S. Doc. 48, pp. 58–60.

responsibility for the peace settlements with the former Axis aggressors.[8] As a result, a large area of Europe, including Germany, Austria, Italy, Bulgaria, Rumania, Hungary, and Finland, was temporarily relegated beyond the pale of United Nations security action.[9] One of the purposes of this proviso in the charter was to spare the United Nations the immense burden of peacemaking at the very outset of its career. Involving as it did, however, the crucial question of Germany's future, this proviso tended to clothe the problem of safeguarding European security with a special regional character.

The disarmament of Germany

The policy of the victors after World War II contrasted markedly with that after the first world conflict. Germany survived the first war with its own central government, was subjected to only a partial and temporary occupation, and was permitted to possess limited armed forces. Punitive economic measures were relatively marginal. But in 1945 the defeat of Germany was total and the annihilation of its government left the victors in full control of the country. The Allies dismantled German heavy industry, divided the country into four zones of occupation, and disbanded the armed forces. In contrast with the settlement at Versailles there was no hint in 1945 that German disarmament was in any way a prelude to a wider limitation of arms.

Demilitarization of Italy and the Axis satellites in Eastern Europe proceeded along more conventional lines.[10] The military clauses of the peace treaties with these countries concluded in 1947, although they contained various limitations, did allow national armies, navies, and air forces of a modest size.[11]

A new threat to security—the U. S. S. R.

Following World War II the Soviet Union refused to treat Germany as an economic unit and dropped an "Iron Curtain" between its own and the Western Zones. Western-Russian negotiations on the future of Germany reached such an impasse at the London Conference of Foreign Ministers toward the close of 1947 that the Western delegations felt that agreement with the Soviet Union could be reached—

> only under conditions which would not only enslave the German people but would seriously retard the recovery of all Europe.[12]

Meanwhile, in Eastern Europe, in violation of its pledges and of the sovereign rights of the peoples concerned, the Soviet Union was consolidating its grip not only on the former Axis partners, Hungary, Rumania, and Bulgaria, but also on Poland, Yugoslavia, and Albania.

[8] Article 107 of the United Nations Charter provided: "Nothing in the present charter shall invalidate or preclude action, in relation to any state which during the Second World War has been an enemy of any signatory to the present charter, taken or authorized as a result of that war by the governments having responsibility for such action."

[9] Article 107 of the United Nations Charter did not preclude the placing on the U. N. of peacemaking or other responsibilities regarding the Axis nations if the victor countries so agreed. However, with few exceptions, this has not been done. The United Nations has dealt with two questions arising from the failure to conclude a peace treaty with Germany: the rights of the occupying powers in Berlin, and the request for a United Nations Commission to investigate whether conditions for a free election existed in Germany.

[10] It was influenced by the fact that three of them—Italy, Rumania, and Hungary—after their defeat joined in the war against Germany and were not considered to be a continuing threat to peace in the same sense as Germany.

[11] Excerpts from the treaties are given in United States Senate Foreign Relations Subcommittee on Disarmament, Disarmament and Security: A Collection of Documents, 1919–55. Washington, Government Printing Office, 1956, pp. 462–478. (Hereafter cited as Collection of Documents.)

[12] U. S. Department of State, The United States and Germany, 1945–55. Government Printing Office, May 1955, p. 18.

Democratic rights were squelched and puppet regimes were imposed. In most of these countries the Red army was used to enforce Communist domination. The military power of the Soviet Union, now stretching halfway across Europe, threatened the democratic nations of the west.

Despite the growing tension between the Soviet Union and the western democracies, agreement was reached in 1947 on peace treaties for Italy, Finland, Rumania, Bulgaria, and Hungary. However, these did not break the control of the three latter countries by the U. S. S. R. In Greece, Communist guerrilla pressure, sustained by the neighboring Soviet-dominated states, had become so menacing that the United States in March 1947 embarked upon a program of military and economic aid to that country and to Turkey which was also a target of Soviet threats.

Three months later the United States offered the Marshall plan for economic rehabilitation to all Europe. It was accepted by the Western European nations but rejected and then denounced by the U. S. S. R. and its Communist subordinates in Eastern Europe.

Soviet expansionism assumed a more ominous form in October 1947 when Moscow announced that the Communist Parties of the Soviet Union, Eastern European countries, France, and Italy had formed a cooperative international organization, soon labeled the Cominform, which aimed at sabotaging the European recovery program and which denounced the United States "plan of world expansion." By this time the term "cold war" had become current to describe relations between the Western and Eastern European blocs.

These moves by Moscow were a prelude. When the Soviet Union in 1948 took measures of a more forceful nature, its relations with the western nations took a critical turn. In February the Communist coup d'état in Prague profoundly shook the Western World. Then the Soviet Union tried to force the Western Powers out of Berlin by a blockade. By the time the blockade had been beaten by the airlift and the New York agreement of May 1949 lifting the blockade was concluded, the Western Powers had erected an alliance structure in defense against the new threat to their security.

Western European reaction: the Brussels Alliance

Under the terms of a pact signed at Brussels on March 17, 1948, Great Britain, France, Belgium, the Netherlands, and Luxembourg bound themselves for 50 years to give the party attacked "all military and other aid and assistance in their power." [13]

The conclusion of the security treaty at Brussels not only sanctioned the principle of pooled defense but it also reflected the shift in the estimate of the main aggressive threat to Europe. The Treaty of Dunkirk, concluded only a year before, was specifically aimed at Germany. But the Brussels Alliance was more broadly directed at any aggressor, obviously including the Soviet Union.

The main impact of Western European Union (WEU), as the Brussels Alliance was called, was not so much in what it did but in what it led to. Along with the Rio Treaty for the defense of the

[13] This defensive clause, concluded within the framework of the United Nations Charter, was supplemented by other provisions for economic, social, and cultural cooperation. To carry out the responsibilities of the alliance a Consultative Council, composed of the five foreign ministers and so organized as to function "continuously," was established to confer on questions within the framework of the treaty. A joint military command was created with headquarters at Fontainebleau, France. The text of the treaty is given in the Collection of Documents, p. 481.

Western Hemisphere [14] it broke ground for the construction of regional collective defense arrangements within the framework of the United Nations Charter. In utilizing article 51 [15] of that instrument the Brussels pact was not only modeled on the Rio Treaty but it also helped set a pattern for the later North Atlantic Alliance.

The "Vandenberg resolution"

In May 1948 the Senate Foreign Relations Committee favorably reported the "Vandenberg resolution" which recommended the development of regional and other collective defense arrangements under the United Nations Charter. In this connection the committee specifically mentioned the Brussels Treaty concluded only 2 months before. The resolution supported association of the United States with such collective arrangements "as are based on continuous and effective self-help and mutual aid, and as affect its national security," and the Senate committee indicated that such association might involve a treaty commitment and also material aid.[16]

The Senate approved the Vandenberg resolution by a majority of 64–4 on June 11, 1948. Negotiations ensued between the United States and the Brussels Pact powers, in which Canada joined, and they eventually culminated in the signing of the North Atlantic Treaty on April 4, 1949.

The concept of the North Atlantic Treaty

The North Atlantic Treaty opened a new era in western collaboration for security. For the first time in years of peace, North America—the United States and Canada—was linked in formal alliance with most of the nations of Western Europe. Specifically, besides the five Brussels Pact powers, these included Norway, Denmark, Italy, Portugal, and Iceland.[17] In 1952 Greece and Turkey were added to the members of the Treaty. The hard historical logic of such a grouping was explained by M. Paul-Henri Spaak when he signed the treaty for Belgium. He declared:

> Twice within less than 25 years the democracies of Western Europe, the United States of America and Canada have faced terrible dangers. Twice the civilization they represent, their way of life and thought has been jeopardized. Twice it has required military miracles to save them * * * It would be unpardonable to ignore the repeated lessons of history.[18]

The treaty reflected the determination of the United States to participate in the defense of Western Europe. As the report of the Senate Foreign Relations Committee on the North Atlantic Treaty stated:

> The security of the North Atlantic area is vital to the national security of the United States and of key importance to world peace and security. The peoples of the North

[14] The Inter-American Treaty of Reciprocal Assistance concluded by the American states on September 2, 1947. The text is given in Collection of Documents, p. 649.

[15] Art. 51 of the United Nations Charter states in part: "Nothing in the present charter shall impair the inherent right of individual or collective self-defense if an armed attack occurs against a member of the United Nations, until the Security Council has taken the measures necessary to maintain international peace and security."

[16] U. S. Senate Foreign Relations Committee. Reaffirming the Policy of the United States to Achieve International Peace and Security Through the United Nations and Indicating Certain Objectives to be Pursued. Report (to accompany S. Res. 239), S. Rept. 1361, 80th Cong., 2d sess.

[17] Sweden and Switzerland did not join for reasons of neutrality; Germany, which later became a member, and Austria were still under occupation; and Franco Spain represented a special political problem.

[18] Quoted in Atlantic Alliance: NATO's Role in the Free World. London, Royal Institute of International Affairs, 1952, p. 32.

> Atlantic area are linked together not only by the interdependence of their security but by a common heritage and civilization and devotion to their free institutions, based upon the principles of democracy, individual liberty and the rule of law. It is this common heritage and civilization and these free institutions which the signatories are determined to defend.[19]

The treaty named no specific foe and officially it was maintained that the pact was directed against no state or group of states but only against "aggression." This formula expressed the strictly defensive purposes of the alliance and corresponded to its status as a collective defense grouping under article 51 of the United Nations Charter.[20]

The core of the treaty is article 5. Under it the parties agree that "an armed attack against one or more of them in Europe or North America shall be considered an attack against them all." If such an attack occurs, each party is to assist the victim "by taking forthwith, individually and in concert with the other parties, such action as it deems necessary, including the use of armed force, to restore and maintain the security of the North Atlantic area.[21]

To assure that the pledge of article 5 would have military force behind it, article 3 provided that the parties would undertake "continuous and effective self-help and mutual aid" in order to "maintain and develop their individual and collective capacity to resist armed attack." This article echoed the Vandenberg resolution. The day after the treaty was signed requests for military assistance from the United States were made by some of the European states and in the fall of 1949 the Mutual Defense Assistance Act became law, 2 weeks after the President had announced the first atomic explosion in the U. S. S. R.

NATO rearms: Korea and after

In mid-1950, when the North Korean Communists rolled south over the 38th parallel, the European military imbalance was heavily one-sided. NATO had only about 14 divisions[22] on the Continent and less than 1,000 aircraft were available to back them up. The U. S. S. R., on the other hand, had about 25 divisions in Eastern Europe alone, with about 6,000 aircraft available for immediate attack, and all under unified command.[23]

The assault in Korea electrified NATO for it displayed Soviet intentions in a new light. The NATO powers plunged into an intense program of rearmament and decided that Western Germany should contribute militarily to Western defense. The rearmament efforts of the Western European countries during the years since 1950 is reflected in the rise in their defense budgets as depicted in the following table. It shows that the defense spending of the European members

[19] Collection of Documents, pp. 875–876.

[20] Art. 7 of the treaty preserved the rights and obligations of the parties under the United Nations Charter and acknowledged the primary responsibility of the United Nations Security Council for the maintenance of international peace and security. In art. 5 it invoked the authority of art. 51 of the charter regarding the right of individual and collective self-defense and provided that defensive measures under the pact should be reported to the Security Council and be terminated when the latter had taken the measures necessary to restore international peace and security.

[21] Defined in art. 6.

[22] In comparing Communist and Western divisions, it should be kept in mind that a division of the Soviet Union and the Eastern European states comprises 13,000 to 15,000 men, whereas the United States, for example, maintains an infantry division of approximately 17,000 men. Divisions in Western European armies vary in size, but often run somewhat smaller than United States divisions.

[23] Lord Ismay, NATO: The First Five Years, 1949–54, p. 29.

of NATO more than doubled from 1949 ($6.3 billion) to 1953 ($12.8 billion) and then slightly declined.

Defense expenditures and gross national product of the United States and European members of NATO [1]

Calendar year	European NATO			United States		
	Defense expenditure (United States dollars)	GNP (United States dollars)	Defense expenditure as percent of GNP	Defense expenditure (United States dollars)	GNP (United States dollars)	Defense expenditure as percent of GNP
	Billions	*Billions*		*Billions*	*Billions*	
1949	6.3	112.2	5.6	13.6	257.3	5.3
1950	6.7	123.7	5.4	14.6	285.1	5.1
1951	9.3	145.3	6.4	33.4	328.2	10.2
1952	12.5	161.0	7.7	47.9	345.2	13.9
1953	12.8	170.7	7.5	49.6	364.5	13.6
1954	12.3	181.9	6.8	42.9	360.5	11.9
1955	11.9	198.0	6.0	40.5	387.2	10.5

[1] Figures include Greece, Turkey, and Western Germany. Data furnished by International Cooperation Administration.

During the same period the United States stepped up its military aid to Western European countries. Some $14 billion in military assistance has been programed by the United States for the NATO area since 1949.[24]

The armed forces buildup continued until by 1952 NATO had 20 or more equipped and combat-ready divisions in Europe, of which 5 were from the United States.[25]

Unified command and strategy: The formation of SHAPE

To provide the machinery for integrating the expanding armies, air and naval forces in the Western European theater so that they could be trained and deployed in the most efficient manner, the NATO countries in 1950 decided to constitute a supreme military command in Europe. This was the beginning of an elaborate allied command structure which eventually comprised three top commands, with jurisdiction over forces in the Atlantic, the Mediterranean, and in Europe from Norway to Turkey. The Supreme Allied Commander Europe, who up to the present has been an American officer, has responsibility for the proper organization, training, and equipment of the NATO forces assigned to him. In cooperation with national authorities he determines how they should be deployed and establishes priorities of mobilization. He must prepare war plans and in war would command military operations. Recently he has been given additional authority in connection with enforcing levels of armaments in Western Europe and in deployment of forces.[26]

Arms for Germans: The end of demilitarization

In the fall of 1950 the NATO powers reversed the policy of demilitarization of Germany, a striking indicator of how the security situation of Europe had been transformed in only 5 years.

[24] Information furnished by the Department of Defense. The period covered is fiscal 1950 through fiscal 1956 (July 1, 1949, to June 30, 1957).

[25] Five divisions, plus other units. Many commentators at this period frequently referred to the "equivalent of six" United States divisions in Europe. NATO's goal of 25 combat-ready divisions for the end of 1952 was officially announced as "in large part" met.

[26] See below, p. 234.

The appearance of the Soviet Union as the chief threat to European peace, however, did not blind NATO leaders to the risks in German rearmament. From the time the question of reviving German military forces was first broached there was a clear recognition that a balance had to be struck between the advantages and the risks. The problem was to find a working political formula that allowed a substantial German contribution to Western defense but which at the same time safeguarded all against the militarism that three times in three-quarters of a century had seared Western Europe with war. It took 4 years to find such a formula.

The EDC: Its birth and death

The French came forward with the proposal for a European army, or more formally, the European Defense Community (EDC). The French plan [27] called for a European defense organization integrated on both the civil and military levels. The French made it clear that this was the only form—or one similar to it—in which they would accept German rearmament.[28]

When the treaty to establish the EDC was signed at Paris on May 27, 1952, six nations had indicated a willingness to join: France, Germany, Italy, Belgium, Luxembourg, and the Netherlands. If it had gone into effect, the 50-year EDC Treaty would have established a supranational defense organization with common institutions, forces, and budget.[29] It was largely because of these supranational features that Great Britain and certain other West European governments declined membership in the proposed defense community, and their refusal to join handicapped efforts to obtain the necessary parliamentary approval for the treaty in the six signatory nations. For over 2 years statesmen negotiated in an effort to win parliamentary ratification of the pact, but to no avail.

The crucial country was France. The doubt, criticism, and distrust of the EDC voiced in the French press and National Assembly showed that, although certain leaders of the French Government were converted to EDC, much of France at the grassroots was not. By the summer of 1954 all of the signatories had ratified the EDC except France and Italy, and it was clear that the latter would probably do so. On August 30, the French Assembly voted it down.

Rearmament in Western European Union and NATO

With the collapse of the EDC Treaty and related agreements, the 6 EDC nations and Great Britain plunged into a round of negotiations, in which the United States and Canada also participated, and in less than 2 months came up with a substitute that accorded virtual sovereignty to West Germany and provided for the alliance of that country with the Western nations and its rearmament under international control. By the terms of agreement concluded at conferences in London and Paris in September and October 1954, it was

[27] Announced to the French National Assembly by Premier Rene Pleven on October 24, 1950, and often referred to as the "Pleven Plan."

[28] Western Cooperation: A Reference Handbook. British Information Service, 1953, p. 50.

[29] On the day prior to the conclusion of the EDC Treaty Western Germany and the three western occupying powers had signed a convention at Bonn redefining their relations. In effect it recognized the Federal Republic as an independent state subject only to the reservation of certain extraordinary powers to the former occupants, arising mainly from the continued division of Germany and the fact a peace settlement for all of Germany had not been reached. The occupation regime was terminated and controls, including those over industry and armaments, were lifted. Such controls as were henceforward to be exercised over German arms were those of EDC. Validation of the Bonn Convention was made contingent upon EDC's going into effect.

agreed to admit the German Federal Republic to NATO and to an expanded and revived Brussels Treaty.[30]

One of the great advantages of the Brussels Treaty, particularly in the eyes of the French, was that it associated Great Britain with Western defenses in a way which EDC did not. It is true that the Western European Union, as the arrangement under the revivified Brussels Pact was called, did not furnish controls over each participant's armed forces as tight as those under EDC, but it did carry an automatic pledge of mutual assistance and it called for a vehicle of international control for the participants' armed forces and armaments, including those of Western Germany.

The agreements fixed certain maximum armed forces which each country should assign to the NATO Supreme Commander Europe and which would not be exceeded except with the unanimous approval of the seven signatories. In this connection the United Kingdom specifically promised to maintain on the European mainland the four divisions and tactical air force (or its equivalent) then assigned. This promise, plus an indication from the United States that it would renew its pledge to keep in Western Europe such troops as were necessary "to contribute its fair share * * * for the joint defense of the North Atlantic area * * *,"[31] had had an influential effect in swinging French support to the agreements. Such a pledge was subsequently made by the United States President in March 1955.

An agency for the control of armaments was also to be set up within the framework of Western European Union to see that agreed levels of arms for each of the members would not be exceeded and that forbidden weapons would not be manufactured. This last responsibility was to apply to Western Germany which had committed itself not to manufacture on its territory any atomic, biological or chemical weapons, and, under certain conditions, not to fabricate certain other major arms.[32] To do this the agency would be empowered to scrutinize statistical and budgetary information supplied by the WEU parties and also by NATO, and to undertake test checks, visits, and inspections. The latter would be confined to the mainland of Europe and would be conducted at regular intervals. Serious infractions would be dealt with by the Council of WEU according to a procedure to be established.[33]

Finally, the Chancellor of the Federal Republic in West Germany solemnly declared that that country would never have recourse to force to achieve the reunification of Germany or to modify the existing boundaries of the Federal Republic. The United States, Great Britain, and France in turn announced that if any government resorted to force, and thus threatened the "integrity and unity of the Atlantic alliance or its defensive purposes," it would forfeit its rights to the guaranty and assistance provided for in the North Atlantic Treaty. These declarations were designed to calm fears that Western Germany might involve NATO in a war over Eastern Germany or the "lost" German

[30] Under the old 1952 arrangements Western Germany had not been admitted to NATO, but by a special protocol to that treaty did have the benefit of the defense guaranties of its fifth article. Article 5 of the North Atlantic Treaty provided that in the event of armed attack, each signatory would assist the party so attacked by taking individually and in concert "such action as it deems necessary, including the use of armed force to restore and maintain the security of the North Atlantic area." Through another protocol the Federal Republic gave a reciprocal commitment to the members of NATO.

[31] Department of State Bulletin, March 21, 1955, pp. 464–465.

[32] Long-range and guided missiles, certain types of mines, large warships, and strategic bombers.

[33] Collection of Documents, pp. 513–518.

territories to the east. As a further safeguard, the Supreme Commander was also endowed with responsibilities for inspection of forces, and his authority was strengthened so that no redeployment of forces (including the planned German forces) under his command could be made without his consent.

The Communist defense coalition

The Soviet Union condemned the western treaties as "militaristic groupings" that would lead to international strife and engaged in intense propaganda and numerous maneuvers to prevent their conclusion. However, even before the North Atlantic Treaty was signed Moscow had blanketed Communist Eastern Europe with a maze of bilateral alliances that in effect amounted to a multilateral defense system under its own rigid centralized political supervision. This network of bilateral alliances stretched in the first instance between the Soviet Union and Czechoslovakia, Bulgaria, Hungary, Rumania, Poland, and Yugoslavia, and then branched out to link the satellite governments with each other.[34]

During the years it was attempting to block various western defense pacts, the Soviet Union had refrained from formally converting its own defense network into a single overall multilateral treaty. However, the continued failure of Soviet attempts to frustrate the defense plans of NATO gave rise to a new maneuver to destroy the western defense alliance. This maneuver was to devise an organization apparently similar to NATO which would not substantially alter the military structure of Eastern Europe but could be offered in trade for NATO. Within a week after the Paris agreements on controlled rearmament of Western Germany came into effect on May 5, 1955, the Soviet Union, Poland, Czechoslovakia, Hungary, Rumania, Bulgaria, Albania, and Eastern Germany dispatched representatives to Warsaw, where they signed a 20-year pact of mutual military assistance and created a unified military command under close Soviet control. The armed forces of the Warsaw Treaty Organization were placed under the command of a Soviet marshal, and the ministers of defense and military leaders of the other member countries were to act as his deputies.[35] The recent anti-Soviet demonstrations in Poland and Hungary and the changes in the governments in these two countries appear to have greatly shaken the internal cohesion and military effectiveness of the Warsaw alliance. However, the repression of the rebellion in Hungary also served to emphasize the ruthless domination of the Soviet Union over the Eastern European countries.

States unallied with NATO or Warsaw Pact

Not all European states have allied themselves with either NATO or the Warsaw Pact—the western and eastern defense systems. Several nations have elected to maintain a more independent position, although the type of neutrality and degree of armaments of these states vary. They include Finland and Sweden in the Scandinavian

[34] Further details on the Communist-alliance net are given in Collection of Documents, pp. 551–554.

[35] The Warsaw meeting was held May 11–13, 1955. Article 4 of the Warsaw Pact, the key military article, was very similar to article 5 of the North Atlantic Treaty. The Warsaw clause read: "In the event of an armed attack in Europe on one or several states that are signatories of the treaty by any state or groups of states, each party to this treaty shall, in the exercise of the right to individual or collective self-defense in accordance with article 51 of the U. N. Charter, render the state or states so attacked immediate assistance, individually and in agreement with other states that are parties to this treaty, by all the means it may consider necessary, including the use of armed force * * *." The complete text of the Warsaw Treaty is given in Collection of Documents, p. 551. East German armed forces were not incorporated into the unified military structure until after a national people's army was formally created in January 1956.

Peninsula, Switzerland and Austria in central Europe, Yugoslavia in the south, and Spain in the Iberian Peninsula.[36]

Switzerland, traditionally and voluntarily neutral for more than a century, maintains for its defense a national militia in which service is universal and compulsory. It has refused to join the United Nations on the grounds that compliance with the charter provisions might endanger its neutrality.

After a state peace treaty was signed with Austria in May 1955,[37] Austria declared its perpetual neutrality, which it pledged itself to defend with all means at its disposal.[38] According to the treaty of 1955, Austria is not permitted to "possess, construct, or experiment with" atomic weapons and other specified types of weapons. However, it is planning to build up a defense force.

Finland, since the end of the war, has often been considered neutral even though it has a treaty with the Soviet Union to consult with that country in the event of an attack upon Finland. It has limits set on its armed forces by the peace treaty following World War II.

In contrast to these three states, Sweden, Yugoslavia, and Spain maintain comparatively large well-equipped armed forces. Although Sweden has refused to join NATO, it does participate in a Scandinavian defense pact with the two NATO members, Norway and Denmark. Similarly, Yugoslavia signed a Treaty of Friendship and Collaboration (the Balkan Pact) with two other NATO countries, Greece and Turkey, and Yugoslavia has received military assistance from Western nations. However, Yugoslavia, with a Communist government, was once a member of the Soviet bloc and, although bitterness existed for several years after Yugoslavia's break with the Cominform, recently attempts have been made by the Soviet Union to improve relations. Spain has a treaty of friendship and nonaggression with Portugal and it also has an agreement with the United States which grants the latter authority to build military bases on Spanish soil.

D. REDUCTION OF ARMED FORCES

Armed forces in Europe

NATO's military capacity today contrasts with the days before Korea when, as a high Western officer was reported as saying, "all the Russians needed to march to the English Channel was boots." Under the Paris agreements of 1954, Western European Union established a maximum level of about 45 active divisions of ground forces for its members on the Continent, including 12 still nonexistent German divisions. Added to this are 5 American divisions in Western Germany, making a total of about 50 divisions.

Actually, however, NATO forces on the Continent are well below the maximum. Mainly because of cutbacks and the drainage of certain NATO troops to other areas, the NATO command had available at the end of 1955, according to one report,[39] no more than 16 divisions between the Baltic and the Alps and barely 10 more that could be in the front line quickly in the event of an emergency. Moreover, representing as they did a number of countries, the military quality of these divisions was variable. In potential opposition to these

[36] The Republic of Ireland is also unallied.
[37] Collection of Documents, p. 525.
[38] Ibid., p. 529.
[39] Newsweek, December 26, 1955, p. 26.

forces were 175 Soviet divisions, although presumably not all of these were deployed for use in Europe nor were they all up to full combat strength. To this must be added 75 satellite divisions,[40] but in view of the recent anti-Soviet outbreaks in Eastern Europe many observers believe their military value to the U. S. S. R. is limited and in a war against the West might even be a liability. But for the present they are still under Soviet command through the Warsaw Pact. Recently, the Soviet Union announced a plan to cut its armed forces by 1,200,000 men in addition to the reduction of 640,000 it claims to have carried out in 1955.[41] This was to include the disbanding of 60 army divisions, bringing the Soviet Union down to 115 divisions. The satellite countries have also announced cuts in their forces. However, NATO planners estimate that even if the reductions were carried out, it would leave the Soviet capabilities substantially unchanged.[42] As far as manpower goes, however, the cut, if carried out, would reduce the disparity between NATO and Communist forces. The ultimate effect of the recent crisis in the East European captive countries upon the future deployment of Red Army troops or upon announced plans to reduce Soviet forces is not yet clear, but, at least for the present the concentration of Red Army soldiers in Eastern Europe appears to have mounted.

At about the same time that the Soviet Union announced its plans for reduction, there was a redirection of efforts on the part of the NATO countries. The French sent hundreds of thousands of troops to North Africa, and other Western European countries felt that they could plan to cut back, or at least not increase, their conscription periods and ready forces. Great Britain, for instance, announced a schedule of armed force reductions, and in October 1956 there were indications that West Germany's defense buildup would not only be slowed down but that it would be directed at least temporarily toward a goal considerably smaller (some reports said 300,000) than that planned by NATO (500,000).[43] In the United States press reports that American military manpower might be reduced stimulated speculation that some American troops in Western Europe might be withdrawn. However, official United States reports to NATO on its troop quotas for the coming year revealed no cutback in Western Europe.[44] Since the Soviet Union's forceful repression of the Hungarian rebellion and its resort to threats of force in the Middle East crisis, there has been speculation that NATO's efforts will be reinvigorated.

Numerically, NATO forces available in Europe remain lower than those of the Communist East. NATO strategists, however, are seeking to counterbalance the Soviet manpower superiority by capitalizing on the modern military weapons—atomic arms adapted for battlefield use, rocket-propelled missiles, pilotless aircraft, and similar devices. The validity of this approach would seem to depend upon the maintenance of technological superiority by the western nations. But apparently the Soviet Union too has made rapid strides

[40] Testimony of Gen. Alfred M. Gruenther, Supreme Allied Commander Europe, May 31, 1956. U. S. Senate Committee on Foreign Relations, Hearings on the Mutual Security Program for Fiscal Year 1957, p. 1021.
[41] New York Times, May 15, 1956, p. 8.
[42] Testimony of General Gruenther, op. cit., p. 1021.
[43] New York Times, October 17, 1956, pp. 1 and 6; October 18, 1956, pp. 8 and 32.
[44] Department of State Bulletin, August 13, 1956, p. 263.

in developing the new weapons and, according to some observers, might even have surpassed the United States in some respects.[45]

The effect of counting on nuclear weapons has already been reflected in revision of force levels. According to one military analyst:[46]

> When General Eisenhower assumed command of the NATO forces in 1952 [*sic*] the force levels were based on the requirements of conventional war and on the assumption of atomic scarcity. Fifty active divisions and fifty divisions available after 30 days were considered a minimum.
>
> In 1954, when it was realized that atomic plenty was in sight, force levels were revised on the basis of the great assistance that atomic weapons could bring to the defense. Ground force levels were reduced by one-third and a forward strategy of defending all of Germany and Denmark was adopted.

There is the question, however, as to the degree to which atomic weapons can or should substitute for armed manpower. One analyst argues that, because of the need of covering the entire front and the various alternative routes of attack, nuclear reequipment of NATO's battalions would not necessarily reduce the number of ground troops that must be mustered in order effectively to repulse a Communist offensive.[47] Moreover, published accounts indicate that conversion of NATO's forces to atomic armaments organization is not yet complete. Finally, there is the unknown element of the degree to which nuclear weapons would be used in an outbreak of hostilities. The less they are used, the more important manpower becomes.

Proposals for reduction of armed forces and armaments

The levels of the present military forces and armaments possessed by the NATO nations and the Communist countries in Europe would be affected by the disarmament proposals advanced by the Western Powers and the Soviet Union. The United States position is that in disarmament efforts levels of armaments are much more important than levels of manpower, since the effectiveness of troops depends in large part on the weapons with which they are equipped. However, the measurement and comparison of armaments for reduction purposes would be extremely difficult, even if the necessary information on armaments were available. Therefore, in the proposals of both sides military manpower would be established as the gage for measuring the levels to which conventional armaments should be reduced. Both sides follow a common pattern in proposing a uniform top level of manpower for the United States, U. S. S. R., and China, a second and lower level of manpower for Great Britain and France, and a third still lower level for all other nations. Under the western plan, the level of manpower allowed for each country would serve as a "basis for measurement" for conventional armaments. The same is true under the Soviet proposal, which advocates that conventional armaments be reduced "on a scale corresponding to the

[45] See, e. g., U. S. Senate Committee on the Armed Services, Subcommittee on the Air Force. Study of Airpower, hearings. * * * Washington, Government Printing Office, 1956, pp. 769–770.

[46] Brig. Gen. Thomas R. Phillips, Washington Post, July 15, 1956.

[47] Roger Hilsman, Strategic Doctrines for Nuclear War, in William W. Kaufmann, editor, Military Policy and National Security, Princeton University Press, 1956, pp. 72–74.

levels" set for the armed forces.[48] Detailed discussion of the reduction of specific armaments, such as planes, ships, and ammunition apparently has not yet taken place.

The United States has advanced as illustrative figures for military manpower levels during a first stage of disarmament 2,500,000 men each for the United States, U. S. S. R. and China, 750,000 each for Great Britain and France, and a maximum of 500,000 for all other countries. The Soviet Union, on the other hand, has suggested 1,500,000 for the first 3 powers, 650,000 for Britain and France, and between 150,000 and 200,000 for other countries. Recently Moscow has proposed that as a "first step" toward the ultimate manpower levels, ceilings of 2,500,000 and 750,000 for the five major powers be adopted "during the first year." [49]

Effect of proposed manpower and conventional armaments cuts

The numerical effect of the Western and Soviet suggestions for manpower and arms cuts upon existing military establishments of the European countries is shown in the following table, based on estimates of armed forces given in various published sources. Many other factors, such as the Soviet Union's favorable geographic position in relation to many of the areas of tension and the initiative it would have as the aggressor in any conflict, should be taken into account in assessing the effect of the proposals on NATO and the Soviet Union.

In summary, under the Soviet proposal the United States, France, Italy, Turkey, and the United Kingdom would ultimately be required to cut their armed forces in varying degrees, and Western Germany would not be permitted to build its forces to planned levels. Although information on the size of Communist forces is quite uncertain, according to the estimates below the Communist states too would have to make cuts. Already several (Bulgaria, Czechoslovakia, Hungary, and Rumania) have announced cuts which, if carried out, would put them very near the permitted levels. However, the Soviet Union and Poland would have to make further cuts even if their announced reductions were carried out. Spain and Yugoslavia also are substantially over the Soviet-proposed maximum.

The levels advanced by the United States appear to be negotiable, and are supposed to be applicable only during a first stage, with further reductions taking place only as parallel progress is made in the solution of important political issues. They would require much less cutting of armed forces all around—200,000 to 400,000 for the United States and the Soviet Union, insignificant amounts for France and the United Kingdom, and a more substantial reduction for Poland and Yugoslavia. Spain, Italy, and Turkey would not be affected and the Federal Republic of Germany could continue to have a goal of 500,000 men, or less, under arms.[50]

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[48] United Nations Disarmament Commission, Third Report of the Subcommittee of the Disarmament Commission (DC/83, May 4, 1956), annexes 5 and 6.

[49] New York Times, November 18, 1956: 33.

[50] In 1952, the United States, France, and the United Kingdom offered a figure of 1,500,000 for the armed forces of the United States, the Soviet Union, and China. The proposal, however, "was based upon the premise that all nuclear weapons could and would be eliminated from the stockpiles of nations. It was then stated that with the verified elimination of nuclear weapons and with the settlement of political issues, the force level figures of 1,500,000 would be adequate for American and free world security." Senate Foreign Relations Subcommittee on Disarmament, hearings, pt. 7, p. 407.

Country	Estimate of present armed forces based on published sources [1]	Maximum under Soviet proposal	Required cut under Soviet proposal	Maximum under United States illustrative proposal	Required cut under United States proposal
	(1)	(2)	(3)	(4)	(5)
NATO					
United States	2,814,632	1,500,000	1,300,000	2,500,000	300,000
France	752,800	650,000	100,000	750,000	[2]
United Kingdom	[3] 772,000	650,000	120,000	750,000	22,000
Belgium	140,000	150–200,000	[4]	500,000	[4]
Canada	116,000	150–200,000	[4]	500,000	[4]
Denmark	41,000	150–200,000	[4]	500,000	[4]
Western Germany	[5]	150–200,000	[6] 300,000	500,000	[4]
Greece	127,300	150–200,000	[4]	500,000	[4]
Iceland	None	150–200,000	[4]	500,000	[4]
Italy	268,000	150–200,000	68,000–118,000	500,000	[4]
Luxembourg	3,000	150–200,000	[4]	500,000	[4]
Netherlands	39,100	150–200,000	[4]	500,000	[4]
Norway	33,000	150–200,000	[4]	500,000	[4]
Portugal	73,090	150–200,000	[4]	500,000	[4]
Turkey	422,750	150–200,000	200,000–270,000	500,000	[4]
WARSAW PACT COUNTRIES					
U. S. S. R.	[7] 2,900,000	1,500,000	1,400,000	2,500,000	400,000
Albania	[8] 55,000	150–200,000	[4]	500,000	[4]
Bulgaria	[9] 183,500	150–200,000	0–33,000	500,000	[4]
Czechoslovakia	[10] 225,000	150–200,000	25,000–75,000	500,000	[4]
East Germany	113,500	150–200,000	[4]	500,000	[4]
Hungary	[11] 172,500	150–200,000	0–22,000	500,000	[4]
Poland	[12] 570,000	150–200,000	370,000–420,000	500,000	70,000
Rumania	[13] 172,500	150–200,000	0–22,000	500,000	[4]
OTHER EUROPEAN STATES					
Austria	6,500	150–200,000	[4]	500,000	[4]
Finland	38,500	150–200,000	[4]	500,000	[4]
Ireland	13,060	150–200,000	[4]	500,000	[4]
Spain	461,000	150–200,000	260,000–310,000	500,000	[4]
Sweden	73,500	150–200,000	[4]	500,000	[4]
Switzerland		150–200,000		500,000	
Yugoslavia	556,300	150–200,000	350,000–400,000	500,000	56,000

[1] Estimates based on sources available to the public as of June 1956. Cong. Rec. July 26, 1956, p. 13414.
[2] Reduction negligible.
[3] Reductions planned.
[4] No cut.
[5] Goal of 500,000. The new West German Defense Minister, appointed in October 1956, is reported to favor a goal of about 300,000 men, rather than the 500,000 planned by NATO. New York Times, October 17, 1956: 1; October 18, 1956: 32.
[6] From goal.
[7] Estimate of size of Soviet forces if the announced reductions were carried out. Special Assistant to the President on Disarmament, July 13, 1956.
[8] Has announced cut of 9,000.
[9] Has announced cut of 18,000.
[10] Has announced cut of 34,000.
[11] Has announced cut of 20,000.
[12] Has announced cut of 47,000.
[13] Has announced cut of 40,000.

In March 1955 the United Kingdom and France stated that they were prepared to reduce their forces to 650,000, and that other states should have forces "considerably lower" than the 5 great powers, with none higher than before the agreement—

> except that special arrangements will have to be made for certain specified states which will provide for levels of armed forces and armaments such as will reduce the possibility of aggression and avoid a disequilibrium of power dangerous to international peace and security.[51]

It would seem that the latter statement would have reference to Western Germany.

[51] Collection of Documents, p. 293.

Significance of cuts in forces and conventional arms

If the Western proposals on armed forces and conventional arms were adopted, the reductions from existing force levels or goals of the NATO and Warsaw pact nations would be relatively small. The size of the military forces scheduled for Western Germany, so important in NATO defense plans, would be unaffected by the Western proposals. The lower, ultimate levels proposed by the Soviet Union, on the other hand, would probably alter considerably the balance of conventional military power in Europe. Although the Soviet Union states its willingness to accept as a "first step" the same levels as those supported by the Western Powers, nevertheless acceptance of this initial stage would also necessitate agreement to the final levels proposed by Moscow. According to official and other observers the Soviet plan would jeopardize the ability of the United States to maintain its share of forces in Europe and also support commitments at home and in other parts of the world.[52] Moreover, United States officials appear to believe that because of factors such as the geographic location and aggressive tendencies of the Soviet Union, reduction to the levels proposed by the U. S. S. R. would, at this time, endanger the security of the United States and the free nations of Europe.

In both the Western and Soviet proposals the reduced manpower levels would be applied as standards of measurement to reductions of conventional—that is, nonnuclear—weapons only. The level of the nuclear arms possessed by each national armed force would not be governed, under these plans, by the size of that force. Although both sides advocate the control of atomic weapons in other ways, it would appear that adoption of either the Western or Soviet conventional disarmament proposals would not necessarily impose rigid restrictions on the availability of nuclear weapons to their armies. Inasmuch as the NATO forces—and, according to reports, the Red Army also—are being increasingly converted to atomic weapons both the Western and Soviet proposals on conventional arms limitations might become outdated by military technology. This possibility again points up the relationship between proposals for conventional and atomic arms limitations.

E. CONTROL OF NUCLEAR WEAPONS

In the defense of NATO countries, three basic uses of nuclear weapons appear possible: all-out tactical and strategic use, including the employment of thermonuclear bombs on centers of population; the use of "small" atomic weapons for tactical purposes without employing large bombs for strategic purposes, or at least limiting their employment to strictly military targets; and total abstention from use. Which of these roles is assigned to nuclear weapons is of profound significance in the security system of Europe. It is also important to examine the extent to which disarmament proposals for the control of nuclear weapons would affect this defense planning.

Present role of nuclear weapons in NATO

According to statements of NATO strategists, they are relying on the ability to make use of American nuclear power in the defense of Western Europe. Western strategy includes the continued development of United States strategic airpower to deliver nuclear bombs, the equipping of United States troops in Europe with nuclear weapons,

[52] See, e. g., New York Times, July 1, 1956: E3; April 15, 1956: 4E; and Washington Star, May 8, 1956: 5.

particularly the tactical type, and the training of all NATO troops in the use of advanced type weapons and defense against nuclear weapons.

The employment of advanced weapons by NATO forces was formally approved by the North Atlantic Council in December 1954.[53] This decision was generally interpreted to signify that the shift to the new weapons was to compensate for shortages in military manpower, an interpretation which has been confirmed by General Gruenther, Supreme Allied Commander Europe. General Gruenther recently testified:

> * * * Our strategy now is an atomic strategy. Our plans call for the use of atomic weapons. This is the principal means of offsetting our numerical inferiority in conventional forces.
>
> However, we must assure that those forces of ours have the latest and best of modern weapons so that their capabilities to hold the enemy and force him to concentrate, thus becoming profitable atomic targets, are improved.[54]

SHAPE's contingents are now being rephased to a nuclear missile strategy based on a "forward defense," that is, a defense as far to the east as possible.[55]

To effect the conversion to the new strategy, available military resources are being focused increasingly on the modern weapons such as rockets and guided missiles. Wider access to information on these weapons has been granted by the United States, Great Britain, and Canada to their NATO allies in order to facilitate retraining,[56] and the United States is sending such weapons to Western Europe.[57] The United States is, however, forbidden by law from furnishing atomic explosives to other countries.

The end result will be organic changes in tactics and equipment that may well constitute a decisive transformation necessitating land warfare of a nuclear type if aggression occurs, for the modernized European forces, as they are reequipped, might in time find it increasingly difficult to fight by conventional means.[58]

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[53] Communique of North Atlantic Council, December 16, 1954. Department of State Bulletin, January 4, 1955: 809.

[54] U. S. Senate, hearings before the Committee on Foreign Relations on the Mutual Security Program for fiscal year 1957, p. 1022.

[55] The plan calls for a covering force called le bouclier (the shield) of about 30 divisions, including the scheduled dozen German divisions, to offer resistance to an aggressor, thus compelling his forces to concentrate for nuclear bombardment and buying time for the full strength of the NATO nations to be mobilized. Time, February 6, 1956; 23ff.

[56] Decision of the North Atlantic Council in December 1955. See New York Times, December 18, 1955: E5; and February 21, 1956: 10. In December 1955 Britain offered to help the other members of NATO with their development of guided missiles, and it was reported that such weapons would be made available by Britain when its priority requirements were met. This was an encouragement to smaller nations for whom development of new weapons taxed or exceeded their resources. Manchester Guardian Weekly, December 22, 1955; 15.

[57] The Army announced on December 22, 1955, that 6 Corporal guided missile battalions, each equipped with 10 self-propelled launchers capable of delivering atomic warheads on targets up to 75 miles away, would be sent soon to Western Europe. Already stationed in Europe at the time were 1 Corporal missile batallion, 6 280-MM atomic artillery battalions (6 to a battalion with ranges up to 30 miles), and several batteries of Honest John rockets with ranges up to 20 miles. Washington Post, December 23, 1955, p. 1; Washington Star, December 26, 1955, p. A20.

In September 1956 the British announced their Army now had Corporal missiles. Washington Post, September 20, 1956.

See Collection of Documents, pp. 729–730 and 760–761 for limitations imposed by the Atomic Energy Act upon information and materials transferred to other countries.

[58] See James P. O'Donnell, The World's Newest Army, Saturday Evening Post, October 1, 1955: 119. Recently Gen. Maxwell D. Taylor, U. S. Army Chief of Staff, spoke of the necessity of injecting "into a single set of forces an either-or capability," that is, a capability of using atomic and nonatomic weapons in any combination. Department of Defense Press Release 1131–56, October 25, 1956.

With the new nuclear firepower which General Gruenther feels is "an essential part of our armament" and with the German divisions in the field by 1959, the former Supreme Allied Commander thinks—

> we then will be able to give reasonable assurance that we can defend Europe successfully against an all-out attack.[59]

There is one view, however, that disagrees with the aim of building up forces in Western Europe to defend it against all-out attack. Supporters of this view maintain that the United States should place its main reliance for security and for preventing Soviet aggression in Europe primarily upon development of strategic atomic airpower. They think that the rearmament of Western Europe to a point of being able to block an all-out Red offensive offers only a forlorn hope of ever matching Soviet power. Moreover, they say, the United States cannot depend on using airbases in Western Europe because they are too vulnerable. They concede, however, that the strengthening of local West European forces is valuable for morale and for a short temporary holding operation, but believe there really is no point in trying to build up a line in Europe to prevent Soviet invasion.[60]

Mutual deterrence

The emphasis placed on nuclear weapons for defense has led many commentators to believe that it will result in a state of "mutual deterrence," a term signifying that neither the United States nor the Soviet Union, because of fear of atomic retaliation, would start a large-scale nuclear war even though no formal agreement not to resort to it existed.[61]

This view holds that, granting the United States has superiority in long-range air-atomic power and could at the present time defeat the Soviet Union in war, the Soviet Union's nuclear bomb stockpiles are mounting, and its long-range aircraft program is progressing. Both sides, therefore, may have enough nuclear weapons and the means of delivering them to wreak stupendous damage on the other.

"Mutual deterrence" could imply a state in which the Soviet Union would not launch atomic aggression for fear of massive atomic retaliation, and the United States would not defend itself against conventional attack by massive atomic reprisals because of a dread of retaliation in kind. In other words, it could mean that strategic nuclear weapons might be deep-frozen in fear.

The possibility that all-out nuclear war would not be waged is increased also in the light of the scale of damage which would be wrought by wholesale use of hydrogen bombs. Recently the Army's research and development chief asserted that if the United States were forced into a war with the Soviet Union and made an attack in force with nuclear weapons, several hundred million deaths might result from the ensuing radioactive fallout. The deaths might not be confined to the Soviet Union, but because of drifting fallout might

[59] Gen. Alfred M. Gruenther, NATO—Our Greatest Instrument for Peace. Department of State Bulletin, February 27, 1956: 333.

[60] Support for the idea of primary reliance upon strategic atomic airpower is expressed in such sources as Dale O. Smith, U. S. Military Doctrine, A Study and Appraisal, New York. Duell, Sloan & Pearce, 1955; and Maj. Alexander de Seversky, Air Power—Key to Survival, New York, Simon & Schuster, 1950; see Hans J. Morgenthau, In Defense of the National Interest: A Critical Examination of American Foreign Policy, New York, Alfred A. Knopf & Co., 1951, pp. 182-184, for views on limited utility of West European rearmament.

[61] U. S. Air Force Secretary Donald Quarles, Sunday Star (Washington), March 11, 1956: A-11. The term "nuclear stalemate" is sometimes used instead of "mutual deterrence."

extend either to Japan and the Philippines, or to Western Europe, depending on the direction of prevailing winds.[62]

Subsequent to this statement officials of the Atomic Energy Commission reported that recent tests had shown that it was possible to minimize fallout by constructing and using thermonuclear bombs in a different way. After the tests Lewis L. Strauss, Chairman of the Commission, asserted that "mass hazard from fallout is not a necessary complement to the use of large nuclear weapons." [63]

It would seem, therefore, that under certain conditions fallout can be reduced, though not eliminated. The necessities imposed by conditions of peacetime testing, however, could be radically different from those met in a wartime situation. The possibility that the use of strategic nuclear weapons with mass fallout might be militarily desirable in a war with the Soviet Union poses a problem for the Western Europeans and for other nations that might be caught in the radioactive drift. The question for the Western Europeans and for American strategists is whether they would want to exploit the military advantages of mass fallout weapons against the Soviet Union in view of the risks involved for both allied and neutral countries.

Graduated deterrence

The hope of avoiding the nuclear Armageddon which would be a certainty with the employment of thermonuclear bombs, but yet to take advantage of tactical atomic arms has led to the concept of "graduated deterrence."

"Graduated deterrence" implies that nuclear weapons would be employed only on the scale needed to repel aggression. It does not exclude necessarily all-out use of or refraining from use of, atomic weapons. According to this theory, the West would renounce the use of weapons of mass destruction against population centers if the foe did not use them. However, if an enemy used them, the Western Powers would too. Tactical nuclear weapons would be employed but only on a scale graduated to the intensity of the attack. A vital ingredient of the "graduated deterrence" theory is that it be made clearly known to the enemy beforehand so that it will exert its intended influence, or that agreement be made with the enemy to observe such a rule.[64]

A crucial point in the problem is whether as a matter of fact tactical nuclear weapons have been reduced in explosive power to such a point that they are clearly distinguishable from strategic nuclear weapons and that the vehicles for their delivery have become so precise that the destruction they cause is in a category distinctly different from the wholesale and indiscriminate havoc wrought by strategic bombs. Tactical atomic weapons at present available to NATO forces, according to a recent report,[65] are too destructive and the missiles and other means for their delivery are too imprecise for em-

[62] U. S. Senate. Committee on Armed Services, Subcommittee on the Air Force, Study of Airpower, Hearings * * * (pt. X), Washington, 1956, pp. 860–861.

[63] New York Times, July 20, 1956. Willard F. Libby, Atomic Energy Commissioner, asserted in regard to the tests: "Particular attention was paid to the fallout problem in this operation and a major effort was made to produce a megaton-range weapon with an inherently smaller amount of fallout for a given energy release. This effort was successful. In addition, considerable attention was paid to operational factors which would minimize worldwide fallout." U. S. Atomic Energy Commission press release, October 12, 1956.

[64] U. S. Senate Foreign Relations Subcommittee on Disarmament, Hearings, pt. 3, p. 92.

[65] A. T. Hadley, Low-Yield Atomic Weapons: A New Military Dimension, Reporter, April 10, 1956, pp. 23–25.

ployment in a limited way. Low-yield nuclear weapons of very restricted explosive power and high accuracy are being developed, according to this report, but are not yet available. It is possible that since this report was written low-yield weapons have begun to become available, but in any case, until troops in the field can be supplied with such weapons in quantity concrete military application of the "graduated deterrence" principle would seem to be handicapped.

A variation of this problem is the possibility of a Soviet or satellite attack with only conventional weapons, and accompanied by a declaration that atomic or hydrogen explosives would be brought into play only if the West initiated them.[66] Even if there were no ban on atomic weapons, would the Western nations be prepared to suffer the onus of starting what could easily turn into a nuclear holocaust? Or alternatively, if a vital decision were at stake, could the West abandon its atomic advantage?

The problem has been recognized by Western policymakers and NATO strategists.[67] Secretary Dulles has stated [68] that retaliation would be "selective," which indicates an all-out nuclear blow would not be used for a "brushfire" war.

The Secretary said recently:

> * * * There may be local aggressions, so-called "nibblings," not initially involving the most potent weapons. We and our allies should, between us, have the capacity to deal with these without our action producing a general nuclear war. * * * [69]

Moreover, General Gruenther maintains that it is not true that atomic weapons would be resorted to automatically, but that their employment would be subject to decisions of the political authorities of NATO. However, reports of the growing conversion of NATO forces to new, including nuclear, methods of warfare and the reequipment of United States troops with atomic arms suggest that in an actual emergency a decision to exclude a nuclear response might eventually become difficult. But at least for the present NATO armies, according to Gen. Lauris Norstad, who became Supreme Allied Commander Europe, in November, are "dual purpose," that is, they can fight with atomic weapons in a big war or with conventional weapons in a small conflict.[70]

Some have derived consolation from the theory that the risk of a major nuclear conflagration arising from a relatively minor incident is really a salutary factor because it will tend to prevent the minor incident. On the other hand, history is full of wars that started with minor "incidents." Unless a satisfactory answer can be given to the Western Europeans on this score, such as a demonstration that tactical nuclear weapons have been so reduced in scope and means of delivery have become so precise that unnecessary wholesale devastation can be avoided, the security of the continent and the NATO defense structure might be undermined by reluctance and indifference.

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[66] Hanson W. Baldwin has asserted that although the Soviet Union is undoubtedly prepared to use atomic weapons, because of the political disadvantages and because of inferiority in such weapons, it would probably not use them except in retaliation. New York Times, March 28, 1956, p. 8.

[67] According to the Sunday Star (Washington) of March 11, 1956, Air Force Secretary Quarles has declared that among questions needing consideration are the kinds of little wars in which deterrent force might be used, and the reactions of United States' allies to such a policy.

[68] Speech of December 8, 1955. Department of State Bulletin, December 19, 1955, pp. 1003–1007.

[69] Speech at Dallas, October 27, 1956. New York Times, October 28, 1956: 34.

[70] U. S. News & World Report, November 30, 1956: 35.

In the absence of adequate conventional weapons a conflict, even a local incident, might give us no choice but to surrender territory or start dropping the mass-destruction bombs.

Complete prohibition of nuclear weapons

While most comprehensive disarmament plans include ultimately the elimination of nuclear weapons, they do so in the context of broader disarmament plans which would include inspection and control. The Soviet Union, however, has frequently made varying proposals which would have the effect of prohibiting the use of all nuclear weapons even before a comprehensive arms control plan were carried out. Without going into the feasibility of the proposal on other grounds, such as whether a ban on nuclear weapons could be guaranteed, it is necessary to examine the effect such a proposal might have on European security.

A complete ban on the use of nuclear weapons would prohibit their use for tactical purposes as well as strategic. This would shift the burden of the defense of Western Europe entirely to conventional warfare.

NATO's commitment to atomic tactics is growing so rapidly and apparently is so essential to the defense of Western Europe that proposals for the control of armaments which call for the nonuse of atomic weapons of all kinds would have far-reaching implications for the success of its mission. Without such weapons, General Gruenther has declared that NATO would have to adopt a "wall-of-flesh strategy." Increased manpower would be the only alternative for fulfilling NATO's directive, and as political and economic experience has already shown, a difficult one to adopt. Atomic disarmament, General Gruenther concludes, can be considered as practical for NATO only as part of a total plan including forces and conventional weapons.[71]

Development of long-range ballistic missiles

Another proposal for control of nuclear armaments which might affect the European security system in varying ways is one which calls for a ban on tests of intermediate range (1,500 miles) ballistic missiles (IRBM) and intercontinental (5,000 mile range) ballistic missiles (ICBM), equipped with nuclear warheads, in order to prevent the development of these weapons. Such weapons would bring immense destruction without the use of piloted planes.

Once both types of missiles are developed by the two sides, the situation that would then exist is not clear. The balance of terror might possibly continue at a higher level. On the other hand, these missiles might give a surprise aggressor such an advantage the balance might be destroyed. Much would depend upon whether the development of defensive weapons kept pace with the development of the missiles.

In the event, however, that the IRBM was perfected before the ICBM a special problem might arise for Western Europe. The Soviet Union would then be in a position to employ the intermediate range missile against European targets but not against the United States. The latter, however, could use it against Soviet targets only from overseas bases which might be neutralized by sudden IRBM attack or by

[71] Gen. Alfred M. Gruenther, What Atomic Disarmament Means to NATO. Vital Speeches, September 1, 1954; 676–679.

some other kind of military or political offensive.[72] The result could be that the countries of Western Europe would be put at a marked strategic disadvantage, unless the intercontinental airpower of the United States could still be relied upon to deter a Communist IRBM assault.

Soviet proposals to dismantle foreign bases

The availability of foreign military bases to the western alliance is an important factor in the security system of both the United States and Western Europe and one of the large contributions of NATO. At present there are about 130 operational airbases in NATO countries,[73] many of which are utilized by American aircraft. The NATO air force on the Western continent has only tactical functions, but the American long-range strategic airpower, operating in cooperation with NATO's defense system, can launch strikes against the heart of the Soviet Union. The United States is constructing additional such bases in Spain and elsewhere.

These bases facilitate the delivery of a much larger portion of American nuclear strength than would be possible if the United States had to rely entirely on means of delivery with an intercontinental range. Recognizing this, one of the recurrent themes of Soviet disarmament proposals has been the dismantling of bases maintained on foreign territory.

Despite the Soviet Union's claims that it has no military bases on the territories of other states it obviously has troops and military facilities in Eastern Germany, Poland, Hungary, and Rumania.[74] Even if a disarmament agreement were made in such a way that the Soviet Union's access to the use of satellite bases were curtailed along with the right of the United States to use European bases, the effect would still be to the advantage of the Soviet Union. Soviet intermediate long-range bombers and ballistic missiles could reach Western Europe from Soviet soil, whereas the United States would require much longer range planes and missiles to reach the U. S. S. R.

F. GERMANY AND EUROPEAN SECURITY

One unsettled political problem in Europe often closely linked with disarmament efforts is the question of Germany. Germany is now partitioned territorially, politically, economically, and militarily. The rupture in German unity, in the opinion of western statesmen, if it is not healed, will remain a serious and abiding threat to European stability. Time and again they have reiterated that any security plan for Europe that does not satisfactorily mend the division of the German nation will be a delusion.

Secretary of State John Foster Dulles has said:

> We accept the fact that a settlement on Germany would not be practical without at least a partial settlement of the armament problem, notably in relation to Europe.[75]

[72] U. S. Senate Foreign Relations Subcommittee on Disarmament. Hearings, pt. 3, pp. 111–113.

[73] U. S. Senate Foreign Relations Committee. Mutual Security Act of 1956, Hearings * * * Washington, 1956, p. 1026.

[74] See statement by Vyacheslav M. Molotov in United Nations General Assembly, September 23, 1955, New York Times, September 24, 1955, p. 6. The Soviet Union claims the right to station troops in these countries on the basis of the Warsaw Pact and the Potsdam Agreement of 1945. On October 30, 1956, the Soviet Union announced that it was ready to examine with the other countries in the Warsaw Treaty the question of stationing troops in Poland, Hungary, and Rumania. New York Times, October 31, 1956, p. 18.

[75] U. S. Congress, Senate Committee on Foreign Relations, Subcommittee on Disarmament. Hearings, pt. 2, p. 71.

The relationship between European security, German reunification, and disarmament has also been emphasized by the German Federal Government. Dr. Heinrich von Brentano, Minister of Foreign Affairs, said recently:

> * * * There is only one argument which the Soviet Union could put up against our demand for reunification, and that is the apprehension that there might be a shift in power likely to jeopardize its own security * * *
>
> The Federal Government always was and always will be ready to take this one genuine argument of the Soviet Union into account and nobody should doubt that no less a degree of willingness would be found to exist in a future all-German Government * * * If it is really a genuine concern we must, and shall, succeed in finding a solution. The Federal Government is convinced that the key to that solution lies in the problem of disarmament * * * The Federal Government will therefore concentrate its efforts especially on the questions of disarmament, in which it can surely be certain of the support of the German people.[76]

In the Western Nations' view the principal threat to their own security and the security of the world is the U. S. S. R. The Soviet Union, however, places heavy emphasis on blocking what it calls the rebirth of German militarism as a threat to the peace of Europe and its own safety. The United States, France, and the United Kingdom also recognize the fear of Germany, but they maintain that the defensive character of the North Atlantic Treaty Organization and the Western European Union and the nexus of armaments controls over West Germany and other members provided by these two organizations raise a barrier to a resurgence of aggressive militarism in Germany and assure the security of Europe and the Soviet Union.

The incorporation of Western Germany into the NATO defense system, however, did not heal the division of Germany. Moreover, western officials asserted that apprehensions about Germany voiced by the Soviet Union might be legitimate and that it was incumbent upon the West to give Moscow some reassurance regarding western purposes.[77] A means often suggested was some sort of security treaty or guaranty. The change of regime in the U. S. S. R. following the death of Stalin in early 1953 and the conciliatory gestures made by his successors prompted western leaders to test their genuineness.

Western security proposals

The negotiations between the Western Powers and the Soviet Union on the twin questions of European security and German unity received their initial impetus from Prime Minister Winston Churchill of Great Britain. In May 1953, in response to what he called the "apparent change of mood" in Soviet Russia, the British Prime Minister asserted that he did not believe the "problem of reconciling the security of Russia with the freedom and safety of Western Europe is insoluble," and he suggested that the "master thought which animated" the

[76] The Bulletin, a weekly survey of German affairs issued by the Press and Information Office of the German Federal Government, vol. 4, No. 27, Bonn, July 6, 1957, p. 7.

[77] At the Geneva meeting of foreign ministers in 1955 the United States Secretary of State referred to "what we recognize to be the legitimate preoccupations of the Soviet Union and, indeed, of all of us as against the possibility that Germany might again become a militaristic state." U. S. Department of State, Geneva Meeting of Foreign Ministers, October 27–November 16, 1955, p. 50.

Locarno Treaty of 1925 might be applied to the relations between Germany and the Soviet Union. Russia had a right, he maintained, to feel assured that the terrible events of the Hitler invasion would never be repeated.[78]

The joint American, British, and French proposals for European security, as they had evolved by the time of the foreign ministers' Geneva meeting in the fall of 1955, were based on certain premises: The West would try to meet the security aspirations of the U. S. S. R. in regard to Germany insofar as they were legitimate; under no circumstances would NATO be given up; and any system of European security not based on German unity would be inadequate.[79] In regard to the last point the directive issued by the Four Heads of Government at Geneva in July 1955 acknowledged the "close link" between the reunification of Germany and the problem of European security and recognized their responsibility for settling the German reunification problem in conformity with the "interests of European security." [80]

The proposed terms of the "Treaty of Assurance on the Reunification of Germany," as they were submitted in outline form by the Western Powers,[81] had a twofold aim: The establishment of a general mechanism that would operate in case of aggression or threat of attack, and the creation of a localized arrangement in Central and Eastern Europe for limitation of arms and a special warning against surprise attack. The general mechanism involved an obligation to settle any international dispute by peaceful means and a pledge to withhold military and economic assistance from an aggressor. The treaty acknowledged the right of collective self-defense recognized in the United Nations Charter and "treaties under it," and thus did not impair the rights of the signatories to participate in such collective defense arrangements as NATO and WEU. The main action clause provided that an armed attack in Europe by any party—

> which is also a NATO member, against any party which is not a NATO member, or vice versa, would endanger the peace and security * * *, and that all the parties would then take appropriate action to meet that common danger.

In the concrete, this meant that if Germany ordered its new army to march against the East, the other parties would take "appropriate action."

The specific implications of this last indefinite but key phrase were not defined in the document. The Western foreign ministers indicated that among the best guaranties of the treaty were the limitations and controls it provided in a zone in Central Europe.[82]

In applying the directive of the Four Heads of Government, the Western Powers linked the security pact to the Eden plan for welding the two Germanies into a single unified state.[83] An all-German Government founded on free elections, according to this plan, would have the right to shape its own foreign policy. It could choose to

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[78] This was the speech of May 11, in which he made his suggestion for a great power conference "at the summit." Text in Vital Speeches, June 15, 1953, pp. 522–526.

[79] See, for example, Geneva Foreign Ministers, pp. 27, 50, and 88.

[80] Geneva Foreign Ministers, pp. 12–13.

[81] Text in Collection of Documents, p. 562.

[82] These arrangements are described below, p. 32. See Geneva Foreign Ministers, pp. 50 and 140. This part of the proposal was based on suggestions by Prime Minister Eden at the Geneva "summit" conference in July 1955. See U. S. Department of State, The Geneva Conference of Heads of Government, July 18–23, 1955, p. 34

[83] The Eden plan for German reunification was first proposed at the Berlin Conference in 1954. See Collection of Documents, pp. 555–558. The latest version is given in Geneva Foreign Ministers, pp. 30–33.

maintain the alliance with the West, enlist in the eastern bloc, or follow an independent course. The tripartite security proposal specified that the pact would come into force at the time German reunification was achieved.

In the event that a unified Germany should enter the Warsaw Pact, the Communist military group, the Western Powers specified that the military guaranty clause of their proposal would have to be reversed in order to apply to them, and if Germany should follow a policy of nonalliance, then the reciprocal guaranties in the treaty would still "preclude any uncontrolled development of its military strength." [84] The Western plan, however, made no provision for collective defense action against an unallied Germany that might revert to an aggressive policy.

Soviet security proposals

The Soviet Union has consistently ignored Western explanations that a reunified Germany under their proposals would be free to ally itself with NATO or the Warsaw Pact or to pursue a nonalliance policy. It charged that the Western security plan was framed to incorporate a reunified and remilitarized Germany into the NATO military system. It raised the question of what would happen if a united and remilitarized Germany abrogated its treaties and pursued an independent military policy.[85]

The Soviet proposals can be resolved into two main types: The first envisages a permanent security system in which NATO would be liquidated and the division of Germany continued. The second includes temporary or provisional proposals permitting the continuation of NATO for a time, but still preserving the Iron Curtain across the middle of Europe. The Soviet Union purports to favor unification of Germany, but its proposals envisage such, if they envisage it at all, only after the conclusion of a security treaty. Since its proposals for a security treaty have not been acceptable, it could postpone reunification indefinitely. The net impression left by the Soviet proposals was described by Secretary of State Dulles after the Geneva Foreign Ministers Conference in the following terms: [86]

> So we see that although the Soviet Union doubtless wants a European security system * * *, it is not willing to provide an essential prerequisite, namely the reunification of Germany in freedom.

The permanent security machinery recommended by the Soviet Foreign Ministry [87] would be open to all European States, including both East Germany and West Germany separately,[88] and the United States.[89] Communist China would have the right to be present as an observer.

The treaty, which would last for 50 years, contains a nonagression pledge and provides for consultation in case a threat to the peace should arise. In phraseology reminiscent of the North Atlantic Pact, it provides that an attack in Europe against one or several of the

[84] Geneva Foreign Ministers, p. 140.
[85] See, e. g., Mr. Molotov's statement of November 3, 1955. Geneva Foreign Ministers, pp. 119-126.
[86] Geneva Foreign Ministers, p. 4.
[87] The text of the Soviet Union's "General European Treaty on Collective Security in Europe," presented at the Geneva Heads of Government Conference and the Geneva Foreign Ministers Conference on July 20, 1955, and October 28, 1955, is in Collection of Documents, pp. 572-574.
[88] After reunification, Germany would be eligible for membership. But, obviously, in the Soviet plan such reunification would take place only, if it took place at all, on Communist terms.
[89] The Soviet draft security treaty presented to the Berlin Conference on February 10, 1954, stipulated that the United States might be an observer, but soon after the termination of that Conference the Soviet Union, in a note of March 31, indicated it would agree to United States membership.

parties is to be considered an attack against all, and each of the other parties is to assist the victims of attack by "all means at its disposal, including the use of armed force, for the purpose of reestablishing and maintaining international peace and security in Europe." A clause forbidding participation in coalitions or alliances contrary to the purposes of the treaty would result in the elimination of NATO, WEU, and the Warsaw Pact.[90]

Incorporated with this permanent pact was 1 of the 2 principal temporary proposals advanced by the Soviet diplomats. It stipulated that for a period of 2 or 3 years the members could retain NATO, the Warsaw Treaty, and WEU, but during this period they would pledge not to resort to armed force and to settle disputes by peaceful means. It further specified that, "pending the conclusion of agreements on the reduction of armaments and the prohibition of atomic weapons and on the withdrawal of foreign troops from the territories of European countries," the signatories would not take any further steps to increase their armed forces on the territories of other European States.

After the Western negotiators at the second Geneva meeting rejected these proposals of the Soviet Union, the latter offered an abbreviated version of its permanent security treaty.[91] It included provisions such as those for consultation when a threat of armed attack should arise and for military assistance to victims of aggression, but with several significant differences. It permitted the continuation of NATO and other collective defense commitments, and to this extent it was, in the view of the Western statesmen, an improvement over the previous draft pact. But the Soviet proposal still had conspicuous flaws. It was to be temporary only and was eventually to be replaced by a permanent security agreement, which presumably would offer the Soviet Union further opportunity to demand a pact shaped in the same mold as its past offerings. Furthermore, like the other Soviet drafts, it assumed the continued partition of Germany and envisaged membership by both East and West Germany. The pact, too, was intended to be less than all-European in its membership, including, in the first instance, besides the two Germanies, only the Big Four and the other members of WEU and the Communist alliance.

These Soviet draft pacts were considered by the Western representatives as inadequate or actually dangerous to their own countries and to all Europe because ultimately they aimed at dissolution of the North Atlantic and Western European coalitions and perpetuated the division of Germany. According to the statements of the Western Foreign Ministers at Geneva and elsewhere, the Soviet Security Pact, while destroying the concrete defense arrangements of the Western European countries, would not have disintegrated the Eastern bloc, which, they maintained, was welded into a monolithic political and economic unit under centralized guidance from Moscow. The Soviet treaty would not cure the existing division of Europe because the Eastern bloc would continue to exist, and as long as it did the Western States would still have a common interest in defending themselves.

Both British and American armed power would be driven from Europe if the Soviet scheme succeeded and, in Western opinion, the isolated continent would be delivered into the hands of the strongest European power, the Soviet Union. The practical difficulties in

[90] Other clauses impose obligations to determine a procedure for extending military and other assistance, to inform the U. N. Security Council of defensive action under the treaty, to hold conferences and set up political and military consultative organs to implement the treaty.

[91] Text in Collection of Documents, pp. 575–576.

applying the Soviet European security treaty that would ensue from the continuing division of Europe, even after the military coalitions were removed, would be numerous, and could be exemplified in the difference of opinion that might easily arise over designation of an aggressor if conflict occurred between East and West Germany.

The United States, Great Britain, and France found it necessary to reject not only the Soviet proposals for European security, but also other Soviet suggestions such as those for participation of the U. S. S. R. in NATO,[92] and for reciprocal nonaggression pledges by members of NATO and the Warsaw Pact.[93] The Soviet proposal to join NATO was rejected as a transparent maneuver to paralyze that organization, which can act only by virtue of unanimous agreement, by associating in it members of radically differing aims. The suggestion for a nonaggression pledge was considered by the Western nations as meaningless, coming as it did from a government not conspicuous for its observance of pledges, and as unnecessary because such a pledge was already incorporated in the United Nations Charter.

G. NEUTRALIZED AREAS

One type of proposal which frequently enters into discussions concerning European security and the control of armaments is the demilitarization or neutralization of specific areas. Already there is a core of neutral states running north and south between the Communist and NATO countries, consisting of Finland and Sweden in the Scandinavian peninsula, Switzerland and Austria in central Europe, and Yugoslavia in the south.

The principle behind plans to enlarge this neutral area is based on the theory that security is engendered when armed rivals are separated or when certain intermediate zones are demilitarized or, at least, neutralized. Thus any invasion of the zone is rendered an obvious aggression. "Buffer" states or demilitarized zones have frequently been established in the past.[94]

Moreover, the continuing deadlock between the Soviet Union on the one hand and the United States, France, and the United Kingdom on the other in regard to Germany has prompted proposals in various quarters for some form of neutralization of that country as a way out of the impasse. In some cases in Western Europe neutralist opinion maintains that the whole area in general should adopt a "third course" in the hope of escaping from the dangerous field of tension between the two great atomic powers. Some quarters in Germany incline toward neutralism in the belief this is the only practical door to national reunification. The Soviet Union has been a prominent advocate of German neutralization, apparently in the hope of preventing Western rearmament of Germany within the fold of the North Atlantic Alliance.

Soviet proposals for neutralization of Germany

Soviet proposals for German neutralization have generally been timed with an obvious aim of obstructing the alliance of the German Federal Republic with the West and its return to an armed status. Recently, there have been clear indications that the U. S. S. R. is

[92] Soviet note of March 31, 1954, to United States, Britain, and France. Text in Keesing's Contemporary Archives, 1954.
[93] See Geneva Heads of Government, p. 54.
[94] See Marshall-Cornwall, Maj. Gen. James H., Geographic Disarmament, A Study of Regional Demilitarization. London, Oxford University Press, 1935.

determined, despite official statements to the contrary, to continue the existence of two Germanies. The timing and circumstances of Soviet neutralization proposals have been such as to indicate strongly that they have been propaganda maneuvers designed to embarrass Western policy, rather than sincere proposals for the solution of a perplexing problem.

As early as 1952, practically on the eve of the signing of the EDC treaty, the Soviet Union proposed [95] that a reunified Germany be neutralized by withdrawal of all armed forces of the occupying powers, liquidation of all foreign bases in German territory, and the imposition of an obligation upon Germany not to enter into a military alliance directed against any power that took part in the war against Germany. In what appeared to be sharp reversal of policy, the U. S. S. R. also suggested that a unified Germany might have national armed forces necessary for its defense.[96]

This 1952 proposal for an unallied, unitary German state has not been essentially altered by the Soviet Union during the intervening years except by terms designed to make more distinct certain of its provisions. For instance, when the Soviet Union reiterated the suggestion at the Berlin Conference in early 1954, it made clear that its earlier proposal for a neutral armed Germany was really a proposal for a neutral disarmed Germany. At Berlin the Soviet representative spelled out that German national forces should be limited in the peace treaty to requirements of an "internal nature, local defense of frontiers, and antiaircraft defense." [97] Moreover, German production of military supplies and equipment was not to exceed the needs of the armed forces as established by the treaty. In effect, Germany under this plan of restricted rearmament would have been almost demilitarized and practically excluded from a role in great power relations.

The intensity of Soviet agitation for a neutralized Germany reached a peak in the first half of 1955 when Moscow stimulated discussion of erecting a neutralized belt of states running through Central Europe from Sweden on the north to Yugoslavia on the south, and of course including Germany. The Soviet Union's sudden agreement to conclude a state treaty with Austria after a decade of obstruction, provided Austria would agree to be neutralized, that is, stand clear of military alliances and forbid foreign military bases on its soil, was generally interpreted as a maneuver to obtain a similar agreement on Germany.[98] At the Geneva "summit" parley in July 1955, Premier Nikolai A. Bulganin of the Soviet Union attempted to push the idea of neutralization with a declaration that the Soviet Union was prepared to participate in international guaranties of the security and territorial integrity of states that wanted to follow such a policy.[99]

The Western powers, in refusing to acquiesce to a neutralized and demilitarized Germany, cited history and the ordinary precepts of political prudence.[100] For example, the draft plan of the U. S. S. R. implied that controls over German arms would be imposed in the

[95] Note of March 10. Text in Department of State Bulletin, April 7, 1952; 531–532.
[96] Up to this point the U. S. S. R. had been loudly inveighing against any German rearmament.
[97] Berlin Conference, p. 227.
[98] In the course of negotiations on the Austrian treaty the Soviet Union and Austria issued a joint communique on April 15, 1955, in which the following appeared:
"The Austrian delegation gave assurances that the Austrian Republic, in the spirit of the declaration made at the Berlin Conference in 1954, does not intend to join any military alliances or permit military bases on her territory and will pursue a policy of independence in regard to all states which should insure the observance of this declaration." Keesing's Contemporary Archives, 1955, p. 14155.
[99] Geneva Heads of Government, p. 41.
[100] See statements by Western representatives in Berlin Conference (esp. pp. 140–141); Geneva Heads of Government (esp. pp. 25–26 and 70); and Geneva Foreign Ministers (esp. p. 103).

peace treaty itself. The Western negotiators denounced this type of unilateral and discriminating control as a reversion to the methods of the Versailles Treaty and as ineffective and dangerous because experience demonstrated that such controls could not be continued indefinitely.

A large, innately powerful state like Germany, the Western statesmen averred, could not be indefinitely restrained against the will of its people because the latter would consider it discriminatory and vexatious. They contended that neutralization would not work with a state possessing a large territory and population, and especially not one located in a geographically strategic location such as Germany's. Only small states had ever been successfully neutralized before, and generally only when consonant with the desire of the people of those states. The end result of neutralization in the Western view, would be the creation of a large German national army, which the Germans might justify on the grounds they had no allies, and this might be highly dangerous to continental security. Lessons of the past led to the conclusion that Germany could not be isolated in the heart of Europe but should be integrated in a system of collective security, and the Western powers explained that this was the policy they had actually followed.

Another Soviet project for neutralization was designed to apply to the two Germanies pending the reunification of that nation.[101] It called for the neutralization of Germany by the simultaneous withdrawal of occupation forces from both Eastern and Western Germany except for agreed limited contingents to perform "protective functions connected with the control responsibilities of the Four Powers." If a threat to security in either part of Germany should arise, the occupation powers would have the right to recall their troops. Both East and West Germany would have police units as agreed by the four occupying authorities. In order to assure compliance, inspection teams composed of representatives of the Four Powers would be formed. This proposal, or similar proposals for withdrawal of occupation forces, has been repeated on subsequent occasions by the U. S. S. R. In a letter of June 8, 1956, Premier Bulganin called on the West to reduce its forces in Germany, citing that the Soviet Union's cut in armed forces included plans to withdraw 30,000 troops from Eastern Germany. In response to this proposal on August 4, President Eisenhower replied that the problem of Germany could not be dealt with as an isolated matter. Although ostensibly presented by the U. S. S. R. as an immediate means of lessening international tension, adoption of the Soviet suggestion for reduction of foreign forces in Germany would, in the opinion of Western officials, expose Western Germany and Western Europe to aggression, interfere with NATO defense strategy, and perpetuate the division of Germany.[102]

In short, Soviet neutralization suggestions have appeared to be framed to achieve Communist ends rather than to restore unity in freedom to the German nation.

Non-Communist proposals for neutralization of Germany

Prominent among the non-Communist proposals for a neutralized unified Germany is that of the principal opposition party in Germany, the Social Democrats. The key to reunification of their country, in

[101] Proposal of February 10, 1954, at Berlin. See Berlin Conference, pp. 230-231.
[102] Berlin Conference, pp. 162-167.

the view of a representative of the Social Democrats,[103] would be a commitment that Germany would not ally itself with the West or the U. S. S. R.

This spokesman has further advocated that a nonalined Germany should not become a strategic vacuum. It should, he has said, have armed forces of its own to contribute toward its own defense within a general collective security framework. The latter, he has urged, should profit from the lesson of the U. N. Security Council, and not encumber itself with a right of veto.

Theoretically the adoption of these suggestions might halt the present East-West competition over Germany and prevent Germany from playing off the Eastern and Western blocs against each other for Soviet advantage. But in practice many of the objections the Western Powers raised against the Soviet neutralization plan would also apply to the above proposals. There would be no assurance that all parties concerned would honor their commitments to German neutrality, and the Soviet Union, through Poland, would still control the so-called "lost" German territories to the east of the Oder-Neisse Rivers which it could use as a powerful means of blackmail.

Zonal arms limitations in Central Europe

In addition to proposals for neutralization of Germany are those that seek a reduction of international tension in the general area of Central Europe by creating localized areas of disarmament and mutual arms surveillance. The hope of the Western sponsors of such proposals[104] is that they will help inspire international confidence and emulation on a wider scale. A proposal for such a limited zone of relaxation accompanied the project of the Western Powers for a European assurance treaty, which has been discussed earlier. It called for a zone comprised of areas of comparable size on both sides of a demarcation line between a reunified Germany and the Eastern European countries in which levels of armed forces were to be so fixed as to create a military balance. In parts of the zone closest to the demarcation line "there might be special measures relating to the disposition of military forces and installations." Information provided by the parties on their armed forces in the zone would be verified by mutual inspection, which would also serve to warn against any preparation for surprise attack. Another alarm device against surprise aggression was to be an overlapping radar warning system operated in the western part of the area by the Soviet Union and in the eastern part by NATO members.

In response to this Western initiative Molotov maintained that the demarcation line should run between the present Eastern and Western portions of Germany,[105] but he too proposed that armed forces of the Big Four in a limited zone might be restricted under joint inspection controls. He said nothing, however, about the reciprocal radar warning network.

The size and disposition of German military units in the Molotov scheme would be governed by an agreement between the German Federal Republic and the German Democratic Republic reached by an All-German Council composed of representatives of the East and West German Parliaments.[106] The adoption of this latter proposal

[103] Fritz Erler, The Struggle for German Reunification. Foreign Affairs, April 1956: 380-393.
[104] Collection of Documents, pp. 561-563.
[105] Geneva Foreign Ministers, p. 81.
[106] Ibid., p. 98.

would of course shatter the Paris arrangements for regulation of West German armed forces under WEU and NATO, and subject Western Germany's military development to a Communist veto.

A recent addition to the Communist proposal for limitation of Big Four forces in Germany and neighboring states was that the introduction of atomic military formations and nuclear weapons into the area should also be forbidden.[107] The Soviet Union tried to paint this as a sort of "trial" that might lead to general disarmament. However, Western agreement to such a ban would completely nullify present NATO defense strategy.

In its recent proposals of November 17, 1956, the Soviet Union again propounded a plan for reducing forces in Europe, this time offering to consider aerial surveillance over this area. The plan called for a reduction within the next year of one-third in the forces of the United States, Great Britain, France, and the U. S. S. R. in Germany and a "considerable" cutback in troop formations of the same four powers stationed in NATO and the Warsaw Treaty countries. In 2 years, the plan proposed, all foreign military bases on the territory of other states would be liquidated. Finally, Moscow proposed certain international control measures such as ground inspection posts, and expressed its willingness to consider limited application of the aerial photography plan originally suggested by President Eisenhower at Geneva in 1955. According to the Soviet proposal, the aerial surveillance plan might be established "within the area of disposition in Europe of the principal armed forces of" NATO and the Warsaw Pact "to a depth of 800 kilometers (480 miles) east and west of the demarcation line between" them.[108] If adopted in their present form, the Soviet proposals would result in a great advantage for the U. S. S. R. for they would leave the latter in a position to exert preponderant military influence in Europe.

A demilitarized zone might serve its traditional purpose of giving warning in the event of an attack by conventional forces; however, in the event of a planned attack by airpower equipped with nuclear bombs, such a zone might have little effect. A neutralized area might well be bypassed completely as an aggressor, from the heart of his territory, concentrated his power on the heart of his chief enemy.

CONCLUDING COMMENTS

The present Western European security system was created as a result of the Soviet military threat that rapidly materialized in the years following World War II. This security system, encompassed in the North Atlantic Treaty Organization and the Western European Union, has as its goal to build up sufficient strength to make it clearly unprofitable for a potential aggressor to attempt to strike. NATO and WEU are so organized as to permit Western Germany to contribute effectively to Western Europe's as well as its own defense but in such a way as to preclude the rise of German militarism which twice in this century has embroiled Europe and the United States in war.

The conventional armed forces at present assigned to NATO for the defense of Western Europe are of a relatively modest size, but are being strengthened by advanced weapons furnished mainly by the

[107] The Times (London), April 2, 1956: 7.
[108] The text of the Soviet proposal is given in the New York Times, November 18, 1956: 33.

United States. A mainstay of the defense of the western continent is the nuclear air striking power of the United States and Great Britain based in Europe and elsewhere in the world.[109]

The Western European nations and the United States do not intend to abandon this security system for a disarmament agreement which does not offer a security substitute at least as effective as the one in being. Such a substitute would have to take into account at least three factors.

1. *In order to be acceptable it would have to satisfy the reasonable security interests of both sides.* A general security system embracing both the present NATO countries and the nations in the European Communist orbit might assume various forms. Recent negotiations between the Western Powers and the U. S. S. R. have centered around a general European security treaty pledging assistance to a victim of aggression. But whatever the form, it would appear necessary that it assure all parties of protection against any unjustified application of force, or otherwise it would seem futile to expect acceptance. For the western nations assurance of adequate security is particularly vital because of the aggressive character of Soviet policy and the ease with which the Moscow Government can shift from maneuver to maneuver.

2. *Solution of the problem of German reunification is a requirement for genuine security.*—The strategic location of Germany, its large and skilled population, and its economic potential make Germany a key factor in the future of European security. Divided as it is now it looms like an unhealed sore in the heart of the Continent. Its continued partition between the Communist and free world would be a festering menace to international peace, and any attempt to establish a lasting European system of security without ending that partition would be an illusion.

3. *Any reduction of armaments cannot upset the military balance in Europe or the world at large.*—Any European agreement on disarmament and security, although it might soften the tensions between the Communist and the western nations, could not be counted on to alter the basic Communist urge for world domination. It will therefore still be necessary that a balance of strength be preserved on the Continent between the western alliance and the bloc led by Moscow. Moreover, it appears difficult to preserve such a balance in Europe unless it is also preserved in the world at large. The great powers with interests in Europe are also great powers of the world, many of them with vital military, political, and economic commitments in other parts of the globe. In making overall reductions in the armed forces of these European countries their worldwide interests will inevitably have to be accounted for. This factor need not exclude, however, the possibility of establishing in Europe areas of arms limitation or of a specially limited military character in the nature of buffer zones.

[109] On November 13, 1956, Supreme Allied Commander Alfred Gruenther declared: "Probably the outstanding element in the deterrent as of today * * * is the fact that we have air units with an overwhelming capacity which would retaliate very significantly and very destructively * * *." Department of the Army message of November 13, 1956.

DISARMAMENT AND SECURITY IN THE MIDDLE EAST

STAFF STUDY NO. 6

MARCH 17, 1957

PREFACE

By Senator Hubert H. Humphrey, Chairman

The invasion of Egypt, which took place in the fall of 1956, presented additional evidence, if additional evidence were needed, that the world has grown too small to tolerate even limited wars. Whether the reason be national survival, economic interest, or Communist penetration, it is now clear that every major power and many small powers are affected by any situation in which armed conflict may take place.

As of this date the free world may have earned time through the withdrawal of all foreign troops from Egyptian territory and through the adoption by Congress of a resolution which announces the determination of the United States to aid Middle Eastern nations in their efforts to repel Communist aggression. The time earned permits the United States and other nations to work for two conditions essential for the peace and stability of the area: (1) a solution of the problems dividing the Arab States and Israel; and (2) the strengthening of Middle Eastern states—politically, militarily, and economically—to defend themselves against Communist aggression and subversion.

As this study, Disarmament and Security in the Middle East, suggests, the fulfillment of these two conditions may confront the United States with a dilemma. Ending the Israeli-Arab conflict requires, at least in part, as a preliminary measure, a limitation on the amount of armaments going into the area. On the other hand, to strengthen the area against Communist aggression and subversion may require larger local defense organizations equipped with armaments from the United States and its allies. The Communist revolutionary and subversive apparatus loses no opportunity to take advantage of weak governments inadequately protected.

The dilemma, then, is to devise a policy for the area which will decrease the likelihood of military conflict among states in the Middle East and at the same time increase the military potential within the area so that the area as a whole can defend its independence.

To resolve the dilemma, the United States must help tackle the basic political and economic problems confronting the area. The settlement of refugees, the establishment of permanent boundaries, and the creation of sound economic projects to increase living standards are imperative. But formulating interim and long-range policies that are not contradictory necessitates great skill. It demands, among other things, a unified approach by the interested branches of our Government. The crisis in the Middle East is now too great to condone extreme partisanship and to tolerate sloppy procedures and careless pronouncements. It is my hope that in the coming months there will be a joint, bipartisan endeavor on the part of everyone with a responsibil-

ity over foreign relations to develop a truly comprehensive United States Middle East policy—a policy which finds expression insofar as possible through the United Nations. If, however, the United Nations is to play a major role in the Middle East, the United States and other nations seeking to bring peace and security to this area under United Nations guidance and direction must more clearly define the role of the United Nations in this situation—its powers, responsibilities, and jurisdiction.

In the immediate future certain steps should be taken to help keep the tenuous peace in the area. One necessary step is the creation of demilitarized zones and an internationally supervised inspection system to assure that the zones are respected. The inspection system, to be effective, should include aerial surveys and ground inspectors at all necessary points. (It would be highly desirable as a pilot project in the Middle East to institute the aerial and other inspection plans proposed at the 1955 Conference of the Heads of Governments at Geneva.) To enforce such measures, the United Nations or its agent must have the authority to insure compliance.

This staff study, the sixth being written at my request, offers a tremendous amount of background, facts, and impartial analysis with which to understand the complexities of the problem of security in the Middle East. It was prepared under the direction of the subcommittee staff and is based in considerable part on a report by Dr. Halford L. Hoskins, senior specialist in international relations of the Legislative Reference Service, Library of Congress. The study does not necessarily reflect the views of the subcommittee or of any of its members.

MARCH 17, 1957.

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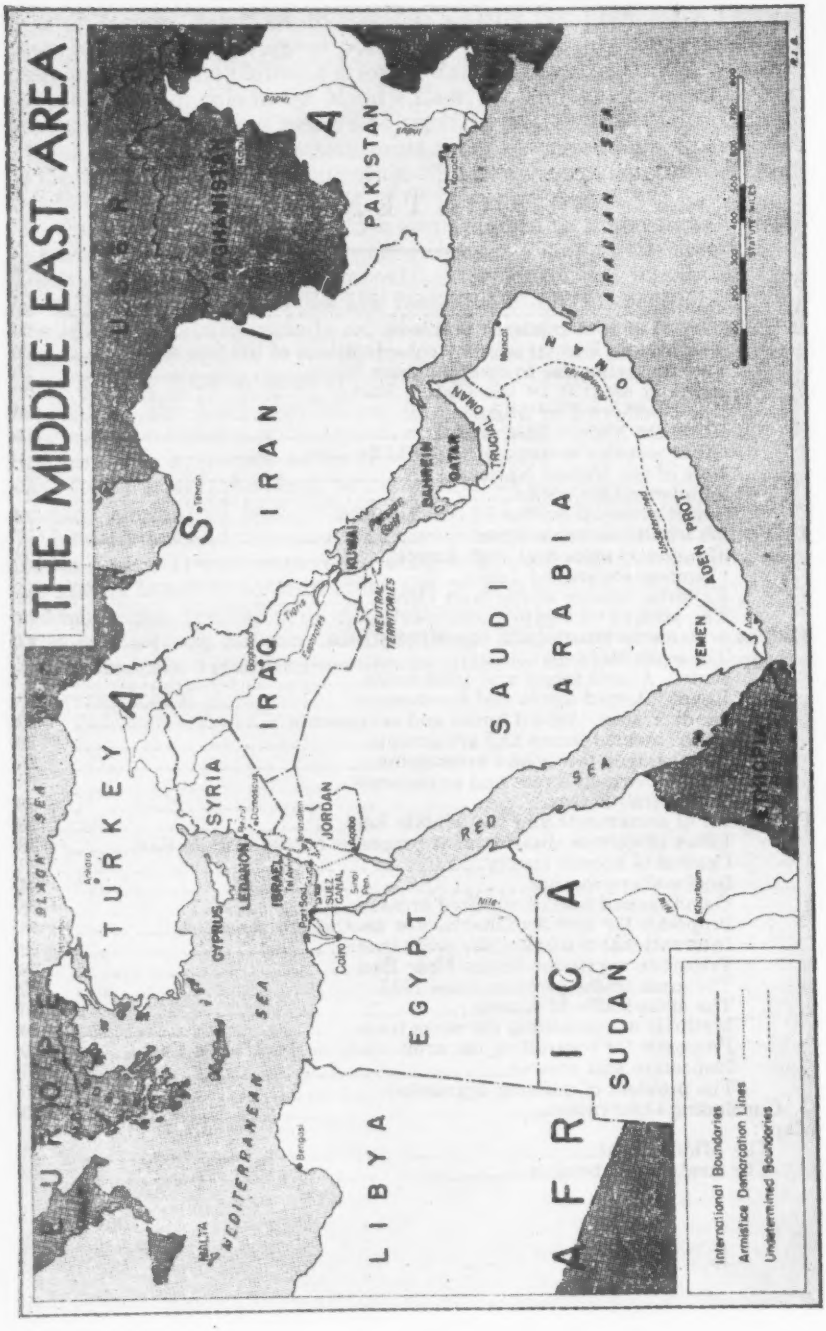
THE MIDDLE EAST AREA
EUROPE
ASIA
AFRICA
U.S.S.R.
TURKEY
SYRIA
IRAQ
IRAN
AFGHANISTAN
PAKISTAN
INDIA
SAUDI ARABIA
YEMEN
ADEN PROT.
OMAN
QATAR
BAHREIN
KUWAIT
NEUTRAL TERRITORIES
LEBANON
ISRAEL
JORDAN
CYPRUS
EGYPT
LIBYA
SUDAN
MALTA
MEDITERRANEAN SEA
BLACK SEA
RED SEA
ARABIAN SEA
SUEZ CANAL
Cairo
Khartoum
Nile
International Boundaries
Armistice Demarcation Lines
Undetermined Boundaries

DISARMAMENT AND SECURITY IN THE MIDDLE EAST

A. INTRODUCTION

For many years the tensions which have persisted in the Middle East have prevented the nations of that area from devoting their full energies and resources to the economic development needed for the welfare of their people. In recent months armed conflict in Egypt shattered the tenuous peace. Warfare in the Middle East, especially when added to the ruthless suppression of a move for independence in Hungary, has added to insecurity everywhere, for the possibility is ever present that a localized war may mushroom and shroud the entire earth with nuclear devastation.

The outcome of the struggle for power and security in the Middle East has become of critical importance for the security of the United States and of all free nations. This area, which constitutes a vital link economically, politically, geographically, and culturally between the peoples of Asia and the peoples of Europe and the Western Hemisphere cannot be ignored in any attempt to reach a disarmament agreement among the major powers.

The following study points out the relationship between the Middle East and the security of the United States and the free world. It describes the systems which have been built to protect the security of the area and analyzes the two sources which endanger that security—intra-area tensions and Soviet ambitions. To help illuminate the problems, a survey of the armaments and armed forces in the area has been compiled from public sources. Finally, a discussion is presented of the effects on the Middle East of current disarmament proposals of the major powers as well as the possibilities for more limited control of armaments within the area itself.

It is not within the scope of this study to evaluate the past, present, or future policy of the United States toward the Middle East, although that policy is discussed insofar as it relates to the above subjects.

B. BACKGROUND OF CONTEMPORARY PROBLEMS

The Middle East in security considerations of the free world

Armed aggression, used as an instrument of national policy by militaristic dictatorships, provoked World War II. At the close of this conflict, the perpetrators had been eliminated and their aggression had been repelled. The United States and its western allies proceeded at once to reduce drastically their military strength. However, evidence soon accumulated that a positive threat to human liberties still existed, the threat of Soviet communism.

The problem that quickly arose for the United States and other nations of the free world, in consequence, became that of devising means not only for their own immediate security but also for that of other and less powerful nations. The United States and its allies sought to create a relatively stable situation in the world by surrounding the Soviet Union and its satellites with a kind of political fence and thus, through the application of a policy of containment, to reduce the likelihood of Soviet aggrandizement in the non-Communist world. In addition, they found it necessary to rebuild their armed forces even while seeking to reduce the hazards of military aggression by means of international agreement on the control of arms.[1]

The practical application of the containment policy for the security of non-Communist areas necessarily included the Middle East. It was considered essential to attempt to set bounds to Soviet penetration toward the Mediterranean, the Red Sea, and the Persian Gulf for several reasons. Among these, three were, and still are, of vital import.

(1) The maintenance of unimpeded passage through the Middle East Corridor has long been of great importance for purposes of world communication and trade. Since 1869 this has principally meant passage through the Suez Canal. The availability of a direct route to the East had had considerable influence on the development of Western Europe, and it has been an important feature of western diplomacy to prevent the substitution of Russian for Turkish power in the Middle East ever since the decline of the Ottoman Empire.

Moreover, the recent stoppage of traffic through the Suez Canal has pointed up the increasing reliance of the nations of eastern and southern Asia on the canal as a channel for their trade with north Africa, Europe, and the Western Hemisphere. Many of the nations of Asia are trying to speed their industrial development and depend upon the use of the canal to expedite imports of raw materials, machinery, and construction equipment needed for their growing economies. India, for example, uses the canal for 60 percent of its foreign trade and it has been reported that the closing of the canal will result in the inability of that country to meet goals set for the second 5-year plan.[2]

(2) A second vital factor is uninterrupted access to Middle East petroleum deposits. In late years not less than 15 percent of the overall fuel requirements and approximately 85 percent of the oil requirements (almost 91 percent of the crude oil processed in European refineries) of the Western European nations have been supplied from the Middle East. Rather more than half of these requirements, down to the closing of the canal in November 1956, had been transported via the Suez Canal; most of the remainder reached east Mediterranean outlets through pipelines from the Middle East producing areas. While the Americas made up most of the deficiency caused by the blocking of the Suez Canal and the sabotaging of the Iraq Petroleum Co.'s Mediterranean pipeline, it is not certain that this could be long continued without permanent damage to the producing fields of the Western Hemisphere. Moreover, the demand for oil products in Western Europe has been expanding at the rate of about 10 percent

[1] See Staff Study No. 3 of the Subcommittee on Disarmament of the Senate Foreign Relations Committee, Control and Reduction of Armaments: A Decade of Negotiations, 1946–56 (Washington, 1956) pp. 166 ff.

[2] Financial Times (London), December 7, 1956, p. 2.

per annum in late years.[3] For these reasons alone the political situation in the Middle East affecting the free use of the Suez Canal and the oil pipelines necessarily ranks high in the security considerations of Western nations particularly.

(3) The Middle East lies between the Soviet Union and the vast populations, embryonic political systems and extensive material resources of Africa. Large areas of this continent are in anticolonial ferment and, therefore, have become a target for Communist penetration. The orientation of the African peoples toward Western democracy or Soviet communism very likely depends in some measure on how the present crisis in the Middle East is met.

These factors illustrate the importance to the entire free world of preventing as far as possible the absorption of the countries of the Middle East into the Soviet sphere. While there is little in the character of the Islamic faith or in the institutional life of the peoples of the Middle East to which Communist philosophy, either in an abstract form or as adapted to Russian objectives, can readily appeal, there are powerful influences at work in the area, particularly in the Arab States, which tend to promote disharmony and hence to spell opportunity for Soviet Russia. In a world environment where the use of force has not been successfully curtailed, the orientation of the countries in the strategic Middle East has a direct bearing on the question of global security.

Factors giving rise to contemporary issues

Among the contemporary situations in the Middle East which bear closely upon security considerations, the following deserve particular attention:

(*a*) *Power rivalry in the Middle East.*—At the close of World War I most of the Ottoman Middle East was under British and French control. This control continued for some years thereafter in terms of administrative trusteeships or mandates. Nationalistic pressures and demands for political independence arising in the mandates found Great Britain, particularly, the more tolerant because Russia, engrossed with internal troubles stemming from the Bolshevik revolution, did not then pose a threat to the area. As British and French authority was relinquished some residual rights were defined by treaty with the emergent states.

The reappearance of aggressive Russian designs in the Middle East in 1946 and 1947 was countered by a war-weakened Britain and by the United States with some momentary success. The decline of western influence everywhere in the area except, perhaps, in Turkey, left room for the inward flow of influence from another power system, that of the U. S. S. R. Soviet Russia, in its diplomatic relations with Nazi Germany, already had openly indicated its designs on the Middle East in November 1940, when it declared in a formal agreement "that its territorial aspirations center south of the national territory of the Soviet Union in the direction of the Indian Ocean." [4]

(*b*) *Nationalism in the Arab world.*—Nationalistic currents were evident in the Arab world several years before the opening of World

[3] The Oil and Gas Journal, vol. 54 (Dec. 31, 1956); the Economist (London), vol. 180 (Aug. 4, 1956), p. 420; (Aug. 18, 1956), p. 565; the New York Times, Aug. 15, 1956), p. 3.

[4] U. S. Department of State, Nazi-Soviet Relations, 1939–41 (Washington, D. C., 1948), p. 257.

War I. Some of these currents, in Egypt particularly, were aimed at seeking political recognition for a particular segment of the Arabic-speaking world. Some of the nationalist leaders in the then Ottoman Empire, however, aimed at Arab unification on a broad scale. This was true of the Arab movement sponsored by Hussain, King of the Hejaz, and led by his son, Faisal, during the latter phases of World War I. Although at that period Britain encouraged Arab leaders to envisage the creation of a single Arab nation, various exigencies mainly of a political nature supervened and the postwar Middle East was pressed into separate molds.

Despite dynastic rivalries in the Arab Middle East, the idea of closer Arab unity persisted.[5] It influenced the formation of the Arab League [6] at the close of World War II. The emergence in succeeding years of the State of Israel provided the league with an additional common bond. Although the attempt in 1948–49 to oppose the establishment of the State of Israel and to recover the whole of Palestine for the Arabs by force of arms was unsuccessful, the presence of a non-Arab State in the area owing its political origins and continued existence largely to the influence of western nations, has had the effect of stimulating the Arab sense of nationality. This has given rise to a species of neutralism in at least some Arab countries, and has reduced their willingness to remain in, or enter into cooperative relationships with nations of the West in recent years.

(*c*) *Arab-Israeli dispute.*—Coupled with the changing balance of power in the Middle East and an unleashed Arab nationalistic spirit, continuing hostilities and lack of peace treaties between the Arab States and Israel have posed a dangerous threat to the maintenance of peace on a global as well as a regional basis. The Arab-Israeli feud is of relatively recent origin. For a good many centuries Arabs and Jews had lived side by side in Palestine quite peaceably, on the whole. Major differences appeared, however, as to whether a Jewish *state* should be erected in Palestine to serve as a haven for persecuted Jews in many countries.

After the close of World War II, the increasing incidence of Arab-Jewish troubles and the repeated failure of compromise measures led Great Britain on May 15, 1948, to abandon its mandate for Palestine. The immediate proclamation of the State of Israel was condemned by members of the Arab League who took up arms against the new state. The subsequent ousting or flight from Palestine of nearly a million Arabs added a new and lasting problem, one that has continued to frustrate efforts to promote peace and stability in the area.

C. THE FABRIC OF SECURITY IN THE MIDDLE EAST

The launching of Communist aggression in Korea in 1950 greatly spurred the efforts of the Western Powers to erect barriers against Soviet expansionism in the Middle East as well as in other areas. The Arab States were manifestly too weak in a military sense to repulse a Soviet attack if it occurred. Consequently, in 1951 and 1952

[5] Radio Cairo frequently dwells on this concept. Cf. Harry B. Ellis in the Christian Science Monitor, October 2, 1956.

[6] For members of the Arab League see footnote 17, p. 269.

the United States and Great Britain attempted to bring the Arab States into a defensive relationship with the West. This was attempted first in terms of a Middle East Command, then in the form of a Middle East Defense Organization. Both of these attempts failed.

The Northern Tier Alliance

The continuing need for a firm defense line in southwest Asia next took shape in the "northern tier" concept; that is, an alliance of those northern Middle Eastern States adjacent to the Soviet Union. Turkey, already a key element in the North Atlantic Treaty Organization, was to be the westernmost anchor. This plan, developing through stages in 1954 and 1955, was brought to realization in the Baghdad Pact.[7] As finally constituted in October 1955, this alliance included Turkey, Iraq, Iran, and Pakistan. Great Britain also adhered to the pact, but the United States, while a promoter and supporter of the alliance, abstained from formal membership. In April 1956 the latter became an associate, however, in joining the Economic Committee and the Countersubversion Committee, and in agreeing to establish a military liaison office at the permanent headquarters of the pact organization at Baghdad.

Although the provisions of the Baghdad Pact are not as specific in terms of treaty commitments as those of the North Atlantic Treaty Organization, it is the most comprehensive Western-Middle East defense arrangement for the area. Members pledge themselves merely to "cooperate for their security and defense." Its members are eligible for and have been receiving United States military aid and have been engaged in building up their military defenses.

Reaction to the Baghdad Pact was violent on the part of the Soviet Union and Egypt. The Soviet Union viewed the Baghdad alliance as a definite threat to Russian interests on the southern frontier. It expressed its displeasure in denunciations of the Western Powers as sponsors of defense pacts in the Middle East and in direct warnings to members of the alliance.[8]

Egypt regarded the pact as a challenge to its leadership in the Middle East. Some of the other Arab States lined up with Egypt. Egypt, having failed in its efforts to prevent Iraq—an Arab League member—from entering into the pact, undertook to offset the Baghdad alinement by tightening its alliances with other Arab states.

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[7] The basic pact of mutual cooperation between Iraq and Turkey of March 29, 1946, is set forth in the Middle East Journal, vol. 9 (spring 1955), pp. 177–178. The pact at Baghdad was signed between Iraq and Turkey, February 24, 1955. The text of the pact is given in United States Senate Foreign Relations Subcommittee on Disarmament, Disarmament and Security: A Collection of Documents, 1919–56. Washington, Government Printing Office, 1956, p. 642 (hereafter cited as "Collection of Documents"). Dates of adherence to the pact by other states are: United Kingdom, April 5, 1955; Pakistan, July 23, 1955; and Iran, October 25, 1955.

[8] In protesting Iran's decision to join the pact, the Soviet Government declared in a formal communication that: "The accession of Iran to this military alinement is incompatible with the interest of consolidating peace and security in * * * the Middle and Near East and contradicts the good-neighborly relations between Iran and the Soviet Union and certain treaty obligations of Iran." The Soviet note charged Iran with violation of the treaty they had concluded on October 1, 1927. This treaty committed each of the contracting parties "to take no part, whether de facto or de jure, in political alliances or agreements directed against the safety of the territory * * * of the other contracting party or against its integrity, independence, or sovereignty" (art. 3). See Hurewitz, J. C., Diplomacy in the Middle East, vol. II, pp. 154–156. Iran, in reply to the Soviet Union, asserted that the Baghdad Pact was not concluded for any aggressive purpose, nor was it directed against any country. Consequently, it "cannot be incompatible with any treaty obligations." Ibid., pp. 415–421. Text of the Soviet note to Iran of November 26, 1955, is contained in J. C. Hurewitz, op. cit., vol. II, pp. 416–418.

Bases for Middle East defense

Related to the objectives of the Baghdad Pact were the bases and defense positions already held by Great Britain and the United States within the Middle East. Under the North Atlantic Treaty Alliance, the United States has been accorded the privilege of utilizing a number of British airbases having reference to the Middle East, including those on the island of Cyprus. It has contributed largely to the construction and to the equipping of bases in Turkey, notably those at Adana, Diarbakr, and Iskanderun (Alexandretta), although the administration of these remains in Turkish hands. Under treaty it has developed an airbase at Dhahran, on the Persian Gulf coast of Saudi Arabia, originally begun during World War II. This base was the subject of supplemental agreements between the United States and Saudi Arabia on June 23, 1949, June 18, 1951, and February 8, 1957.[9]

On September 9, 1954, the United States signed a 20-year agreement with Libya covering the use and supply of a major airbase at Wheelus Field, near Tripoli.[10] This base is an important link in the chain of Middle East defenses.

By a bilateral agreement signed on October 12, 1953, the United States acquired rights to the use of naval and air bases in Greece.[11] Among other things, this arrangement includes facilities for operations of the United States 6th Fleet, normally based at Villefranche on the French Riviera.[12]

Other American bases affecting Middle East defense are located in Morocco and Spain. Of the 5 long-range airbases projected for construction in Morocco, in keeping with NATO strategy, 4 have been completed at a cost of some $410 million. The achievement of Moroccan independence in March 1956 has necessitated a renegotiation of the arrangements for the bases with the new government.

By an agreement with Spain of September 26, 1953, "The Government of the United States is authorized to * * * fit agreed areas and facilities for military use" on Spanish soil. Three major airbases were put under construction as the first phase of the program set up under this agreement. To these have been added two Navy service establishments, a supply center, a seaport and airfield for carrier-based planes. Lately three additional major airbases have been approved for construction.[13]

Although shorn of several of its former defensive positions in the area, notably the elaborate defense network built up during and after World War II in the Suez Canal Zone, Britain still retains important strong points. The transfer to the island of Cyprus of some

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[9] Department of State, Treaties and Other International Acts, series 2288, publication 4345; New York Times, February 19, 1957. The use of the base has been restricted to general observation and the maintenance of communications in consideration of the supplying of planes and personnel for the training of Saudi officers and technicians. Under the arrangement of June 18, 1951, the United States shipped 18 light tanks to Saudi Arabia in February 1956, an act that drew protests from Israel. Cf., hearing before the Committee on Foreign Relations, U. S. Senate, on the situation in the Middle East, February 24, 1956.

[10] Department of State, Treaties and Other International Acts, Series 3107, Publication 5743.

[11] Department of State, Treaties and Other International Acts, Series 2868, Publication 5326.

[12] At the time of the British-French intervention in Egypt, the United States dispatched to the Mediterranean, as a complement of the 6th Fleet, a "hunter-killer" group of eight antisubmarine vessels to guard against possible activities by the Soviet submarines reported to have entered those waters. This group was withdrawn in mid-December.

[13] Mutual defense assistance agreement between the United States of America and Spain. Treaties and Other International Acts, series 2849, publication 5291, Report to Congress on the Mutual Security Program, June 30, 1956, pp. 28–29.

of the strength formerly concentrated in Egypt and the construction of two huge bases on the south coast of the island at a cost of more than $60 million has given this island a large value in Middle East defensive strategy. The heavily fortified positions at Gibraltar and Malta, the British bases at Aden, and the important French base at Bizerte in Tunisia are also relevant to Middle East area defense. It is noteworthy that Great Britain still holds the role of protector of Arab sheikdoms in the Persian Gulf by virtue of 19th century treaty arrangements.[14]

Since World War II, Great Britain has refurbished its wartime bases in Libya, notably at Derna and Tobruk. For several years, it also maintained residual rights in Jordan, defined in a 20-year treaty of alliance of March 15, 1948, including the use of military bases and envisaging the cooperation of the two countries in the event of involvement in war by either party. However, after extended negotiations, the treaty was terminated on March 13, 1957. Britain previously had surrendered to Iraq its two long held airbases of Habbaniyah and Shaibah.[15]

The conclusion of the Baghdad Pact, considered in relationship to the North Atlantic Treaty Organization, the Balkan Pact,[16] and the defensive positions still held about the perimeter of the Middle East, was regarded by the Western Powers as a deterrent to Soviet expansionist proclivities. Its preventive qualities, however, were limited mainly to the contingency of overt physical aggression.

Other security systems of the Middle East

As previously indicated, toward the close of World War II the Arab countries in the Near East formed a League of Arab States for cooperation in military, economic, and other fields.[17] In regard to defense the Arab League Pact provided for collective action against aggression, subject to certain limitations. The signatories did not bind themselves automatically to give military assistance in case of armed attack, but the Council of the League, composed of representatives of the member states, was authorized to decide by unanimous vote what measures to adopt to meet an attack. In the Arab-Israeli war the members of the league did not agree upon a joint military command and their individual national forces fought separately against Israel.

After the Arab-Israeli armistices of 1949 the league members attempted to provide for closer military cooperation in a new treaty which they concluded in 1950.[18] This Treaty of Joint Defense committed the signatories to—

> undertake to go without delay to the aid of the state or states against which * * * an act of aggression is made, and immediately to take, individually and collectively, all steps

[14] These are summarized by Herbert J. Liebesny, International Relations of Arabia: The Dependent Areas, in the Middle East Journal, vol. 1 (April 1947), pp. 148–168.

[15] See Central Office of Information (London), Reference Paper No. 3379 (August 1956) The Security of the Middle East, pp. 8 ff.; New York Times, March 14, 1957.

[16] Members of the Balkan Pact are Greece, Turkey, and Yugoslavia. For text see Collection of Documents, p. 539.

[17] The treaty was signed March 22, 1945, by Syria, Jordan, Iraq, Saudi Arabia, Lebanon, Egypt, and Yemen. The new State of Libya joined in 1953 and Sudan in 1956. Text in Collection of Documents, pp. 615–622.

[18] Text in Collection of Documents, pp. 622–626. See footnote on p. 622 for exact dates of signature.

> available, including the use of armed force, to repel the aggression and restore security and peace.

This defense clause was supplemented by new machinery for military cooperation. A Joint Defense Council was established, composed of the Foreign and Defense Ministers of the member states, under the supervision of the Arab League Council, as well as a Permanent Military Commission, composed of representatives of the general staffs, with responsibility for joint-defense planning.

The Cairo Pact of 1950 did not include the establishment of a unified military command. However, after the Baghdad Pact was signed, Egypt undertook to associate some of the Arab States in closer military ties. On October 20, 1955, Egypt signed a mutual defense agreement with Syria, providing for a permanent joint military command, and a similar pact with Saudi Arabia on October 27, 1955.[19] Yemen joined this military alinement in April 1956. These treaties provided for the use of all measures, including armed force, to repel an aggression. The organization created by the treaties included a Supreme Council, composed of the Foreign and War Ministers, with authority to issue directives for joint military policy, and a war council, composed of the chiefs of staff, with responsibility for war planning. Finally, the treaty provided for the creation of a joint command under a single commander in chief with authority in peace and war over the units placed at his disposal by the member states. In December 1955 an Egyptian general was appointed commander in chief,[20] but to what extent the joint military command has otherwise been implemented is not clear at the present time.

Although Jordan has not adhered to the Egyptian-Saudi Arabian-Syrian alliance, in October 1956 the Jordanian Government entered an agreement with Egypt and Syria that, in case of war with Israel, the three countries would place their armies under a joint command headed by an Egyptian general.[21] In addition, in January 1957, Egypt, Saudi Arabia, and Syria agreed to furnish a subsidy of about $36 million to Jordan to replace the annual payments the latter was receiving from Great Britain. The Arab subsidy, which was to be used for financing the Jordanian Army and auxiliary defense forces, was intended to enable Jordan to terminate its military alliance with Great Britain.[22]

The various alliances and pacts concluded by the Arab states in the postwar period show that these states are divergent in their defense policies. Egypt, Saudi Arabia, Syria, and Yemen form a security bloc that seeks to play an independent power role in the Middle East, and nearer to which Jordan appears to be moving. Iraq, on the other hand, as a member of the Baghdad Pact, has alined itself with the Western Powers in defense against the Soviet Union. Libya has a defense alliance with Great Britain [23] and a military base agreement with the United States. Lebanon and the Sudan have stood aloof from ex-

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[19] Unofficial translation of the Egyptian-Syrian Mutual Defense Pact and the Egyptian-Saudi Arabian Mutual Defense Pact is found in the Middle East Journal, vol. 10, No. 1, (winter 1956), pp. 77–79.

[20] Maj. Gen. Abdel Hakim Amer, Egyptian Minister of Defense.

[21] Keesing's Contemporary Archives, 1956, p. 15166. King Hussein of Jordan denied that the agreement had alined Jordan with the Egyptian-Saudi Arabian-Syrian alliance. Facts on File, 1956, p. 354.

[22] Christian Science Monitor, January 21, 1957 :1.

[23] Text in Collection of Documents, p. 635.

ternal military ties, except for their commitments under the Arab League.

The military capabilities of all the Arab States are limited. This limitation was underscored by the noninvolvement of Egypt's allies in the conflict resulting from the British-French-Israeli invasion of that country. Egyptian President Gamal Abdel Nasser declared that Syria, Saudi Arabia, and Jordan offered military help to Egypt but that he refused it because of his policy of keeping other states out of the conflict.[24]

Role of the United Nations

The United Nations has played a prominent role in the security system of the Middle East. Action at the United Nations influenced the withdrawal of Soviet troops from Iran in 1946 and since the early months of 1947 it has been dealing almost continuously with the Palestine question.[25]

On November 29, 1947, hoping to check the rising tensions between Zionists and Arab groups, the United Nations General Assembly adopted a partition plan for Palestine which was accepted by the Jews but rejected by the Arabs. In April 1948 the Security Council endeavored to effect a cease-fire and truce in the fighting already in progress and appointed a Truce Supervision Commission. Subsequently, on May 14, 1948, the U. N. General Assembly appointed a Mediator for Palestine, whose principal task was to endeavor, in cooperation with the Truce Commission for Palestine, to give effect to cease-fire orders of the Security Council issued from time to time during the recurring periods of fighting between Arab and Israeli forces.[26] It was largely through the efforts of the Acting U. N. Mediator, Ralph Bunche, that armistice agreements were signed between Israel and Egypt, Lebanon, Jordan, and Syria in the early months of 1949.[27]

The lines occupied by the combatants at the close of general hostilities in 1949 were those determined by the fortunes of war. They had no particular reference to any of the Palestine partition plans previously drawn up by international commissions. The Arab-Israeli armistice lines at many points were wholly illogical from practical points of view: villages, farms, natural lines of communication often were split. Provisions were also made for the United Nations to aid in the maintenance of the armistices.[28]

Attempts by the United Nations Conciliation Commission (set up by the General Assembly on December 11, 1948) to promote a final peace settlement between the Arab States and Israel have been almost wholly unavailing. While specific obstructions to a permanent agreement have been numerous on both sides, the fundamental obstacles have been: (1) wide disagreement on boundary lines—the Arabs now

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[24] Speech of November 9, 1956, New York Times, November 10, 1956, p. 11.

[25] The United Nations role in connection with the Israeli penetration into Egypt in October 1956 will be discussed later.

[26] General Assembly Res. 186 (S–2) and subsequent resolution of the Security Council: S/801 (May 29, 1948) and S/902 (July 15, 1948).

[27] New York Times, November 17, p. 1; December 20, 1948, p. 1; January 16, p. 1; February 2, 1949, p. 1. On July 21, 1949, Dr. Bunche submitted a final report on the armistice negotiations (S/1357). The armistice agreement between Israel and Egypt was signed February 24, 1949 (S/1264/Rev. 1). The Israel-Lebanon agreement was concluded on March 23 (S/1264/Rev. 1), the Israel-Jordan agreement on April 3 (S/1302/Rev. 1), and the Israel-Syria agreement on July 20 (S/1353/Rev. 1).

[28] See below, p. 293.

holding that any final settlement should be made along the lines of the General Assembly's partition plan of November 29, 1947; and (2) the disposition of the Palestinian Arab refugees who, according to the directive of the General Assembly of December 11, 1948, should be permitted to return to their former homes. In the absence of the willingness of Israelis and Arabs even to discuss terms of agreement except in accordance with their incompatible minimum demands, an established and permanent peace has been denied to the area.

Supplementary action

The difficulties encountered in attempting to enforce the United Nations-sponsored armistice agreements and the efforts of both Israel and the Arab States to build up their military potentials after the inconclusive war of 1948–49 brought the Western Powers to the point of planning direct and concerted measures for preserving the tenuous peace. With the object of minimizing border disputes and inhibiting an arms race, the United States, Great Britain, and France collaborated in issuing, on May 25, 1950, a declaration embodying, in addition to the decision to regulate arms shipments to the area so as to prevent either aggression or an arms race,[29] the following line of policy:

> The three governments * * * [declare] their unalterable opposition to the use of force or threat of force between any of the states in that area. * * * Should they find that any of these states was preparing to violate frontiers or armistice lines, [they] would, consistent with their obligations as members of the United Nations, immediately take action, both within and outside the United Nations, to prevent such violation.

As relations between Israel and the adjacent Arab States continued to worsen in 1955 and 1956, the three Western Powers were brought to the point of considering seriously the advisability of carrying their declared policy for the preservation of peace among the Middle East states to the point of implementation. Before a decision had been reached in this matter, the Soviet Union, taking the position that it enjoyed not only interests but also (presumably in consequence of the arms agreement with Egypt) official relationships in the area, on February 13, 1956, launched a diatribe from Radio Moscow against the Western Powers. It denounced the Tripartite Declaration as a violation of the independence of the states of the Middle East and of the "principles and aims" of the United Nations Charter. It ended with the significant assertion that—

> The U. S. S. R. Ministry of Foreign Affairs deem it necessary to state again that any action leading to complications in the area of the Near and Middle East and to increased tension in that area is bound to be the subject of legitimate concern on the part of the Soviet Government. * * * The Soviet Government, true to the principles of its peaceful policy, will continue to defend the cause of peace. * * * and, jointly with other interested states, will help consolidate security in that area.[30]

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[29] Collection of Documents, p. 631. See below, p. 27.
[30] The New York Times, February 14, 1956, p. 1.

The possibility of taking action under the Tripartite Declaration continued to be mentioned occasionally in United States and British circles in succeeding weeks and measures were taken by both countries to strengthen their armed forces in the Middle East area. The United States indicated, however, that there was no intention of sending troops to the Middle East without United Nations sanction or an invitation from the Arab States or from Israel.[31] Once the Western Powers had participated (with Soviet cooperation) in the action taken by the United Nations Security Council on April 4, 1956, in dispatching the Secretary General, Dag Hammarskjold, on a mission to survey various aspects of compliance with the armistice agreements, there was no public indication of any plan to implement the 1950 declaration.

Soviet proposal for Soviet participation

Against this background the Soviet Union, on April 17, 1956, 2 months after its first pronouncement and on the eve of the Bulganin-Khrushchev visit to England, issued another statement repeating its denunciation of Western tactics, emphasizing its "unswerving" devotion to the cause of peace in the Middle East, and reaffirming its "readiness to contribute, with other states, to the peaceful solution of unsolved questions."[32] To this, Secretary of State Dulles replied that while the United States had taken the position "some time ago" that measures for peace in the Middle East were properly a matter of concern for the United Nations, any "genuine Soviet desire to support and back up the United Nations in this matter * * * would, of course, be welcomed by the United States."[33] The visit of the Russian leaders to Great Britain did not result in a plan of procedure other than an agreement to give "the necessary support to the United Nations in strengthening the peace in the Palestine area.[34]

D. FACTORS LEADING TO THE CURRENT CRISIS

The complications resulting from the Arab-Israel war of 1948–49, as has been noted, are especially consequential from the security point of view. They have kept in turmoil the greater part of this strategic area and, in so doing, have seriously endangered not only the essential interests of the Middle Eastern countries but also the United States and its allies. In particular, they have thwarted attempts to stabilize the area and have provided an occasion for the penetration into the Middle East of Soviet Russia, whose power, influence, and fixed designs constitute the fundamental danger to the welfare of the peoples of the area, as well as to the security of the United States and to Western Europe.

The Soviet arms deal with Egypt

Egypt is essentially a poor country. Its population of some 23 million is devoted mainly to agricultural pursuits in an extremely constricted environment. The revolutionary junta, which came to power in July 1952, aimed at a program of economic and social re-

[31] Christian Science Monitor, March 15, 1956, p. 1; Washington Post, March 22, 1956, p. 1; New York Times, April 4, 1956, p. 1.
[32] New York Times, April 18, 1956, p. 1.
[33] Department of State Bulletin (vol. 34, No. 879), April 30, 1956, p. 711.
[34] The New York Times, April 29, 1956, p. E3.

form. The project for the building of the Aswan High Dam on the upper Nile, now being held in abeyance, was an important feature of that program.

Domestic reforms, however, constituted only one aspect of the aims of the ruling group in Egypt. The furtherance of Arab nationalism was no less an objective. Colonel Nasser and his colleagues took the lead in this cause. For example, they helped nudge the British out of their highly developed defense bases in the Suez Canal zone, took up the cause of the struggling Moslem elements in French north Africa, opposed every scheme for organizing a prowestern defense group among the Middle Eastern States, and inspired the Arabs to a greater degree of unity in their treatment of Israel.

A program of this nature called for quantities of arms and armaments of modern types. Equipment that could not be obtained through private commercial channels was sought for a time from Great Britain and the United States. Before the negotiation of the Egyptian contract with the Soviet Union for Czech arms, the United States, on two occasions, attempted to come to an agreement with Egypt respecting arms. The first occasion came in August 1954, in the form of an offer to negotiate a military assistance pact under which equipment from the United States would be supplied under the terms of the Mutual Security Act.[35] The Egyptian Government took this offer under advisement but rejected it early in 1955 on the ground that an agreement under the Mutual Security Act meant "American influence" in Egypt.[36]

The following June United States authorities indicated a willingness to consider on a commercial basis an Egyptian request for arms. The Egyptian regime submitted a list of items desired under this arrangement.[37] Before the transaction was completed, however, Egypt was apprised of terms under which it would be able to obtain Soviet arms. Since, on balance, these terms, involving payment in kind, appeared to be more attractive than those offered by the United States, requiring the cash payment of $27 million, the latter were rejected and an agreement was concluded by Egypt with the Soviet Union.[38]

Colonel Nasser's insistence that the Soviet arms transaction would not result in any "Russian or Czechoslovak influence" in Egypt could not obviate the probability that, in accepting Czechoslovak implements of war under Russian auspices, Egypt would be somewhat dependent on the Soviet Union, at least to the extent of the necessity of maintaining a flow of essentials from the same source in respect of repairs, ammunition and technical skills.

The arming of Egypt by members of the Soviet bloc signified the breaking through of the defense line erected in terms of NATO and the Baghdad Pact and the extension of Soviet political influence into the Middle East and north Africa. The timing of this move was significant: It occurred at the moment when Great Britain was completing the evacuation of its base in the Suez Canal Zone, was being denounced by Yemen—with Saudi Arabian backing—with re-

[35] The New York Times, August 31, 1954, p. 1; September 8, 1954, p. 1.
[36] William T. Stone. International Arms Deals, Editorial Research Reports, vol. 2, No. 19 (November 1955), p. 796.
[37] New York Times, September 26, 1955, p. 1; September 28, 1955, p. 1; October 2, 1955, p. 1. The latter an "authoritative" summary.
[38] New York Times, September 28, 1955, p. 1.

spect to the retention of the post of Aden, and was being compelled to reevaluate its defense posture with respect to Jordan.

Countermeasures by Israel

Egypt's purchase of Communist arms caused Israel to step up military preparations. Anxiety over the efforts of the Arab States to build up their armaments had been manifested by Israeli authorities ever since the close of the Arab-Israel war in 1949. Israel objected to western plans for a defense system in the Middle East which would include supplying arms to the Arab States. In 1954 it protested to both Washington and London against military aid to Iraq and it registered opposition to the Baghdad Pact on the ground that it would disturb the precarious balance of power.[39] The Egyptian-Czech arms deal was condemned by Israel in language much stronger than that used in inveighing against military aid policies of the Western Powers. Foreign Minister Moshe Sharett, speaking in Washington on November 21, 1955, insisted that—

> For Israel this momentous change * * * spells a threat to her very existence.

He pointed out that—

> * * * Egypt had obstinately refused to advance from armistice to peace with Israel * * *. She went on record before the Security Council by declaring herself formally to be at war with Israel. She has maintained that position despite its repudiation by the Council as illegitimate * * *. It is reasonable to suppose that arms obtained by a state which openly professes to be at war with its neighbor are intended for the prosecution of that war. The world has yet to hear * * * how the Soviet Union or * * * Czechoslovakia propose to reconcile the supply of offensive weapons to such a country with their declared policy of striving to achieve a relaxation of international tension and of promoting world peace.[40]

The incidence of border raids increased after this period both in number and in the degree of violence.

Egyptian seizure of the Suez Canal

On July 26, 1956, without prior warning, Egypt's President Nasser seized all available assets and resources of the Suez Canal Co.[41] This action, terminating the company's concession which would have expired automatically in 1968, was widely interpreted as a form of retaliatory reply to the decision of the United States and Great Britain to withdraw their offer of financial aid for the construction of the Aswan High Dam.[42]

President Nasser issued a statement of assurance that the Suez Canal would continue to be operated as before in keeping with The Suez Canal Convention of 1888.[43] However, the partial blockade that had been applied to vessels in the service of Israel and instances of Egyp-

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[39] New York Times, March 7, 9, 28, 1954; March 5, 1955.

[40] Excerpts from an address at the National Press Club, November 21, 1955, as reported in the Israel Digest, vol. 6 (November 25, 1955), p. 2.

[41] New York Times, August 5, 1956, p. 3; August 16, 1956, p. 2.

[42] New York Times, July 20, 1956, p. 1; July 21, 1956, p. 1.

[43] New York Times, August 1, 1956, p. 3.

tian interference with other canal shipping,[44] together with Egyptian encouragement of gunrunning to disaffected elements in (French) North Africa, brought the French and British Governments to the point of forceful intervention, either to restore the Suez Canal Co.'s rights or to place the canal under international operational control. Counsels of the United States exercised a moderating influence on warlike impulses at that time, although neither direct negotiations with Egypt by representatives of the user nations nor consideration in the United Nations Security Council of the issues involved in succeeding months gave promise of resulting in a settlement of canal issues. Differences in views as to the best way of dealing with the Suez situation tended to widen the measure of disagreement existing between the United States, on the one hand, and Great Britain and France, on the other.

The attacks on Egypt

On October 29, 1956, Israeli forces thrust into the Sinai Peninsula. The Israeli Government declared that this was a defensive measure to eliminate Egyptian commando bases there. The forces temporarily occupied the Sinai Peninsula, destroyed Egyptian fortified positions and seized or demolished considerable Egyptian equipment. Britain and France promptly announced their intention of intervening to protect the Suez Canal and on October 31 invaded Egyptian territory.

The Anglo-French expedition had two proclaimed objectives:[45] (1) to interpose a barrier between Israeli and Egyptian armed forces with a view to preventing the full development and spread of a Middle East war, and (2) to guard the Suez Canal pending the working out of an acceptable plan for the future operation of the waterway.

The actions, however, were denounced by nations throughout the world, including both the United States and the Soviet Union. The United States on October 30 requested an emergency meeting of the Security Council, and introduced a resolution which noted Israel's violation of the armistice and called for a cease-fire, the withdrawal of Israeli armed forces behind the armistice lines, and restraint from the use of force or aid to Israel by all member states. The resolution was vetoed by the United Kingdom and France. Subsequently, a special session of the General Assembly was called, in accordance with the uniting for peace resolution of 1950.

The General Assembly then passed a resolution on November 2 noting the disregard of the armistice by the parties, the Israeli penetration into Egypt, and the military operations of Britain and France in Egypt. It urged a cease-fire and withdrawal of the forces of parties to the armistice behind the armistice lines. The resolution recommended that all members refrain from introducing military goods in the area of hostility, and requested the Secretary General to observe and report on the compliance. Later a resolution was passed calling upon the United Kingdom and France to withdraw their forces from Egypt.[46]

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[44] New York Times, January 14, 1955, p. 2.
[45] Anglo-French action in the Middle East—statements by members of the United Kingdom Government, from reference division, Central Office of Information, London, Nov. 21, 1956.
[46] United Nations documents A/Res. 390, AA/Res. 392, and A/Res. 395.

On November 5, 1956, the General Assembly adopted a resolution establishing a United Nations command for an "emergency international force to secure and supervise the cessation of hostilities," and appointed the Chief of Staff of the United Nations Truce Supervision Organization, Maj. Gen. E. L. M. Burns, as chief of the command. The emergency force was composed of units from states other than the permanent members of the Security Council and was under the command of an international official.

Soon afterward, British and French forces withdrew completely and Israeli forces withdrew from all of the territory occupied except the Gaza strip and the area bordering on the Gulf of Aqaba.

E. THE ARMAMENTS SITUATION IN THE MIDDLE EAST

The arms buildup

Since the conclusion of the armistices that terminated full-scale Arab-Israeli fighting early in 1949 an eventual resumption of the war has been a contingency for which both Israel and the Arab states have felt compelled to prepare. Israel, with a population of only some 1.8 million and lacking the means of economic self-support, appeared superficially to be facing an insuperable handicap in preparing for a mortal contest with the members of the Arab League whose populations reached a total of not less than 55 million. Israel endeavored to offset, as far as possible, the disparity in numbers by seeking arms equipment of late model and high quality.

At the same time the Arab States, ascribing their military failures in 1948–49 largely to poor equipment, also sought up-to-date weapons and equipment with which to overcome Israel's defensive position, experienced military staff, and demonstrated fighting spirit. Thus, both Israel and members of the Arab League, while availing themselves of opportunities to obtain desired items of military equipment through private and frequently unpublicized channels, were unceasing in their efforts to obtain some of the more improved types of conventional armaments—always ostensibly for defensive purposes—directly from the governments able to supply such equipment.

The extent to which Israel and the Arab States succeeded in building up and improving their military equipment in the 7 years prior to Israel's invasion of the Sinai Peninsula at the end of October 1956 is difficult to ascertain accurately from the information available to the public. As far as the United States and Great Britain are concerned, figures available in January 1956 showed that in the 4½-year period from January 1951 through June 1955 these 2 countries had shipped 4 times as much military equipment in the form of arms and ammunition to the Arab States as to Israel.[47] The value of shipments to Israel was placed at $1,763,000, as compared with a valuation of $6,708,000, on military supplies destined for 5 Arab States; Egypt, Saudi Arabia, Syria, Iraq, and Lebanon. This did not take into account British supplies or arms and equipment to Jordan, nor the thousands of tons of ammunition and other military equipment left in storage in Egypt upon British withdrawal from the Suez Canal Zone and which Egypt seized after the invasion of 1956. It is apparent that in addition to the

[47] The New York Times, January 28, 1956. Based on the Commodity Trade Statistics series published by the United Nations Division of Economic and Social Affairs.

arms and equipment openly purchased or supplied under arrangements with the United States, Great Britain, or other countries, both sides added to their armaments more or less surreptitiously as opportunity offered,[48] and each sedulously avoided publishing any details concerning its armed strength.

Israel: Armed forces and armaments

Prior to the events of October-November 1956, Israel is believed to have had at least 50,000 men (and women) in uniform well equipped with small arms mainly of British and Czech manufacture.[49] Probably 200,000 more could have been mobilized for the armed forces within a few days, but it is unlikely that they could have been uniformly equipped. The Israeli Army appears to have been fairly well supplied with field guns and tanks. Some small items of equipment, such as mortars, now are manufactured in Israel.

The Israeli armed forces in some respects constitute a polyglot army. Not more than a third of those in the armed services are native-born Palestinians. The rest come from many parts of the globe, mainly from Iraq, Poland, Yemen, and North Africa. Some language difficulties result from this circumstance. At the age of 18 all Israeli youth (except rabbinical students) are called up for 2½ years of regular military service. Thereafter they remain in the reserve, subject to annual refresher stints, to the age of 49 years.

Although Israel has had a mutual defense assistance agreement with the United States since 1952,[50] the quantities of arms purchased under the agreement have been comparatively small.[51] A major Israeli request for the purchase from the United States of some $50 million worth of armaments came after the Czech-Egyptian arms agreement of September 1955, and is still pending.[52]

The principal source of supply for Israel's arms appears to have been Western Europe, although during 1948 the provisional Israeli authorities had obtained numbers of West German-manufactured planes and quantities of small arms from Czechoslovakia. During the year 1955 Israel succeeded in obtaining obsolete and obsolescent British and American tanks through agencies in France,[53] and it was reported that enough tanks had been obtained to equip two armored divisions.

Israel's air force, which at the beginning of 1957 consisted of several hundred aircraft, including 50 to 75 modern jet planes, like its navy, has been considered the best in the Middle East.[54] The jet planes appear to have been supplied primarily from France and Canada,[55]

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[48] New York Times, June 12, June 26, October 5, 1956.

[49] New York Times, February 26, 1956; April 15, 1956.

[50] Mutual Defense Assistance Agreement of July 23, 1952. Treaties and Other International Acts Series 2675. Department of State Publication 4991.

[51] In November 1956, it was reported that small arms purchases made by Israel in the United States in the preceding 16 months were valued at $4 million and that a considerable part of the orders had not been delivered prior to the commencement of military action in the Sinai Peninsula in late October. New York Times, November 2, 1956, p. 1.

[52] New York Times, October 29, 1955. p. 1; January 28, 1956, p. 3.

[53] Great Britain, Foreign Office, Export of Surplus War Material. CMD 9676. January 1956, p. 12.

[54] Hanson Baldwin: New York Times, January 3, 1957. p. 3

[55] In November 1955, when France announced an intention to resume delivery of jet fighter planes and other arms to Egypt on long-standing order, it indicated at the time that it had been selling arms, including jet fighter planes, to Israel (New York Times, November 12. 1956, p. 1, and November 26, 1955, p. 2). In April 1956, Israel took delivery of 8 jet fighter planes from France and 12 more Mystere jets were supplied in the following month as a "last shipment" (New York Times, April 15, 1956, p. 1; and May 13, 1956, p. 1). There is some evidence that still other French Mysteres were being delivered to

and some of the naval equipment has come from the United Kingdom.[56]

During the brief campaign in Egypt in the fall of 1956 Israeli forces announced the capture of Egyptian war materiel—tanks, vehicles, and arms, mainly of Soviet manufacture—valued at some $50 million.[57]

Egypt: Armed forces and armaments

Regardless of total population figures, it would appear that the Arab States have not been able to match Israel in effective strength of ground forces. The total manpower of the armed forces of Egypt, Saudi Arabia, and Syria, now nominally under a single (Egyptian) command, is believed not greatly to exceed 160,000.[58] Egypt, Israel's principal antagonist, had in its regular armed forces prior to November 1956, 75,000 to 100,000 trained men in a fair state of readiness for action.[59] Incomplete evidence indicates that a large part of this force did not see action during Israeli, British, and French incursions in October-November 1956.[60] The regular Egyptian Army is supplemented by small numbers of fedayeen or irregulars, employed in scouting and raiding. The regular forces are made up of young men between 18 and 30 years of age, called up for 18 months of military training. Some are retained in active service for 3 years; others are kept in reserve.[61] Early in 1956 all able-bodied males of military age were required to register for a possible draft.

Egypt's strength in armaments appears to have increased since its arms agreement with the Soviet Union in September 1955. While the official announcement of the agreement did not reveal the quantities, types of arms or cost of the materials contracted for, informed sources reported that the agreement called for the delivery of a variety of equipment, including planes, tanks, submarines, and artillery, at cut rates to the value of about $80 million, payment to be made principally in Egyptian cotton and rice.[62] After the agreement with the Soviet Union, Egypt received shipments of arms from various Communist sources, including Communist China.[63] The total value of shipments

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Israel prior to the latter's invasion of Sinai at the end of Ocotober. These fighters were superior to the MIG–15's supplied to Egypt from the Soviet bloc, but probably were not the equal of the Russian MIG–17, some numbers of which appear to have been in Egyptian hands prior to the outbreak of hostilities. To offset the latter, Israel had purchased not less than 24 jet fighters from Canada of the United States F–86 Sabre type. Reportedly, these planes had not been delivered at the time of the military thrust into the Sinai Peninsula (New York Times, October 31, 1956, p. 11 and November 1, 1956, p. 9).

[58] Israel received two British destroyers in the autumn of 1955 (New York Times, July 26, 1955, p. 3).

[57] Washington Post, November 11, 1956, p. A4.

[58] New York Times, February 26, 1956; January 3, 1957, p. 3. Early in July 1956, Syria was reported to be organizing a separate force consisting of Palestinian refugees (New York Times, July 2, 1956).

[59] New York Times; November 4, 1956, p. 11; January 3, 1957, p. 3.

[60] *Ibid.*

[61] New York Times, April 15, 1956, p. E5.

[62] New York Times, October 26, 1955, p. 6. The war materials specified are understood to have included 100 to 200 obsolescent MIG–15 jet fighter planes, a number of light IL–28 jet bombers, 50 to 100 Soviet-designed heavy tanks, 5 to 10 submarines, and some quantities of light and heavy artillery (New York Times, November 10, 1955, p. 10, and November 11, 1955, p. 9). In April 1956 Egypt announced the delivery of a number of Russian-built minesweepers (New York Times, November 11, 1955, p. 9 and November 12, 1955, p. 1).

[63] In October 1955, Red China supplied 100 tons of arms consisting principally of machineguns (Washington Post, October 21, 1955, p. 1). This followed a trade agreement with Communist China concluded in August 1955. Subsequently the Egyptian Government extended official recognition to the Communist Chinese regime on May 17, 1956 (New York Times, May 18, 1956, p. 1). In September 1956, 15 vessels flying the flags of Communist countries were reported to be discharging cargoes of arms in Egyptian ports (New York Times, October 29, 1956, p. 3).

from the Soviet bloc up to the end of October 1956 was placed at $420 million.[64]

Although Egypt's principal source of arms imports during the past year and a half has been the Communist bloc, both before and after the agreement with the Soviet Union Egypt obtained some arms from non-Communist countries. These have included a great variety of material from many different countries, for instance, planes from the United States, Italy, Canada, and France; small arms from Spain, and tanks from France.[65]

During the brief period of hostilities with Israel, Britain, and France in the fall of November 1956, Egypt suffered substantial losses in military equipment. There is a great discrepancy between the statistics given out from Israeli sources and those from Egyptian sources on the nature and quantities of materials destroyed or captured, but even President Nasser has admitted that the losses in the Sinai Peninsula were substantial. In his summarized report on military operations, released early in December, Nasser stated:

> All the cars we lost we replaced from British Army stores in the Suez case. There were 200 cars. We took them all.[66]

President Nasser has already seized thousands of tons of British military supplies left behind when British forces evacuated the Suez Canal Zone in June, 1956. Much of this materiel can be utilized by Egypt either in refurbishing its own military establishment or in aiding other Arab States with military items.[67]

Saudi Arabia: Armed forces and armaments

Saudi Arabia possesses an army of about 15,000 men.[68] Much of its equipment appears to have come from the United States under agreements relating to the use by the United States of the air base at Dhahran on the Persian Gulf.[69] After the visit in February 1957

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[64] This was so much more equipment than Egyptian forces could absorb to advantage that it gave rise to speculation that some of it may have been intended for the use of Soviet "volunteers" to be brought in by air in the event of hostilities with Israel (New York Times, November 12, 1956, p. 1).

[65] Small shipments of civilian aircraft, intended for training purposes, had been obtained from the United States (hearing on The Situation in the Middle East, op. cit., p. 17). Other training planes had been acquired from Canada (New York Times, January 18, 1956, p. 3 and March 9, 1956, p. 2). Small arms had been obtained from Spain under a contract negotiated in 1954 (Christian Science Monitor, October 29, 1956, p. 4). Perhaps as many as 10 French jet fighter planes of an early model were received in November 1955 (New York Times, November 26, 1955, p. 2). At the end of that year, nearly 200 reconditioned British World War II tanks had been purchased. In November 1955, Egypt was said to be purchasing 30 jet fighter planes from Italy (New York Times, November 11, 1955, p. 12 and November 12, 1955, p. 1). Throughout the summer of 1956 other deliveries of weapons and armaments to Egypt were reported—40 light tanks from France, and rehabilitated war materials from the West through private Swiss, Belgian, and German channels (New York Times, October 5, 1956).

[66] From a translated and condensed version of an article by Colonel Nasser appearing in a Cairo weekly publication. (New York Times, December 4, 1956.)

[67] Under the Anglo-Egyptian Treaty of 1954 Great Britain withdrew its forces from the Suez Canal base but it was agreed that Britain could keep military equipment at the base and that British forces could return to it in case of attack on Egypt or certain other Middle Eastern states. (See text in collection of documents, p. 640–642.) These remaining British rights were terminated when President Nasser, on January 1, 1957, denounced the Anglo-Egyptian Treaty of 1954, effective as of October 31, 1956. (New York Times, January 3, 1957.)

[68] New York Times, February 4, 1957, p. 3.

[69] Early in 1956 Saudi Arabia received from the United States 18 light reconnaissance M–41 tanks, supplementing a few light and heavy bombers, suitable only for training purposes, which had been delivered under the 1951 agreement on Dhahran. (New York Times, February 26, 1956, pp. 32 and 33. Washington Star, March 2, 1956, p. A 2. Hearings on the Situation in the Middle East, February 24, 1956, pp. 8, 9, passim.) In the hearings of February 24, 1956, Secretary Dulles stated, "* * * in general, we have felt the problem of Israel and its Arab neighbors was not in any way involved with the shipment of arms to Saudi Arabia, because things like tanks cannot get across the desert." Ibid., p. 24.

of King Saud to the United States, when the Dhahran base agreement was extended for 5 years, the United States agreed to supply military equipment, services, and training to Saudi Arabia. While the amount and type of equipment to be made available were not officially disclosed, reports place the total at approximately $50 million.[70] However, the United States apparently is not the only source for military supplies. For example, in April 1956 Saudi Arabia released information that it was buying some British-built jet planes from Egypt where these were being replaced by Soviet planes.[71]

Syria: Armed forces and armaments

Syria has an army of about 65,000 men with about 175 tanks.[72]

The situation with respect to Syrian armaments, while not well defined, has been of considerable interest to Western powers because of the fear that Syria might come under Soviet influence. Reports reaching United States authorities during the last quarter of 1956 indicated that, while rumors of the presence in Syria of considerable numbers of late-model Soviet planes were exaggerated, extensive shipments of other sorts of arms and military equipment from Soviet-controlled sources were received during the year. This was confirmed by Syrian spokesmen who admitted also that groups of Syrian technicians had been dispatched to Czechoslovakia for special training. Informed guesses at the cost of materiel received by Syria from Communist sources through the end of October 1956 placed the value in the range between $56 million and $100 million.[73]

The mainstay of the relatively small air force was believed to be 14 British Meteors.[74]

Iraq: Armed forces and armaments

At the end of 1956 Iraq maintained an army of 50,000 to 60,000 men.[75] Reliable estimates as to the extent of arms and armaments possessed by Iraq likewise have been difficult to determine. Having but a small population of approximately 5 million and having but meager financial resources until very recently, Iraq heretofore has lacked the means to develop a military establishment of any consequence. It participated in the Arab war against Israel, however, and accepted the armistice agreements made by Israel and Syria and Jordan.

Iraq's entry into the Baghdad Pact gave it access to Western arms supplies. In 1955 Iraq and Great Britain concluded an agreement whereby Iraq was to purchase military equipment from the latter. Deliveries in 1956 under this agreement included tanks and jet

[70] New York Times, February 9, 1957, p. 1.
[71] Washington Post, April 5, 1956, p. 1.
[72] New York Times, January 3, 1957, p. 3.
[73] New York Times, November 30, 1956, p. 1; December 3, 1956, p. 1; December 11, 1956, p. 11; and December 16, 1956, p. 32. At the close of the year delivery of Soviet weapons and material, constituting something less than half of all Syrian army equipment, reportedly included 120 T–34 tanks, 50–60 self-propelled guns, about 50 122–millimeter howitzers, 32 122-millimeter guns, at least 3 152-millimeter guns, more than 30 85-millimeter antiaircraft guns, at least 36 6-wheeled armored personnel carriers, and not less than 20,000 rifles, and 20,000 submachineguns. (New York Times, January 1957, p. 3.)
[74] New York Times, January 3, 1957, p. 3.
[75] New York Times, January 3, 1957, p. 3.

planes.[76] Iraq has also obtained military supplies from the United States under the military assistance agreement of 1954.[77]

As of January 1957, the Iraqi air complement consisted of about 180 aircraft, fewer than 100 of them combat planes.[78]

Jordan: Armed forces and armaments

Jordan, at the time of the dismissal of Lt. Gen. John Bagot Glubb in 1956, had a well-trained force of 20,000 in the Arab Legion with a program of expansion underway.[79] Given a stable political background, this might be regarded as the most effective military force in the Arab world. Aside from the equipment supplied to the Arab Legion while it was under the command of a British officer, Jordan has not ranked as a strong military state. Following the change in Jordan's political orientation in October 1956, Egypt supplied Jordan with five British-type jet fighter planes.[80]

Other Arab States

Other Arab countries have only small armed forces and meager armaments. Libya, a member of the Arab League yet alined through defense treaties with the United States and Great Britain, in 1956 received from its Western partners approximately $1 million worth of military equipment with which to equip and train an armored squadron in the minuscule Libyan Army.[81]

Lebanon might be able to muster a force of 5,000 to 8,000 men.[82]

As for Yemen, it is unlikely it could add appreciably to the strength of Arab ground forces which might be arrayed against Israel. In 1957 it was reported that Yemen had received some arms from Czechoslovakia through an arrangement made after Western governments had refused to supply the weapons.[83]

F. CONTROL OF ARMAMENTS AND THE MIDDLE EAST

Effect of current disarmament proposals on the Middle East

The disarmament efforts of the United Nations and the major powers to date have been primarily concerned with reducing the threat of a third world war by bringing about the reduction and control of

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[76] In consequence of the special agreement signed at Baghdad on April 3, 1955, replacing the Anglo-Iraq Treaty of 1930, the United Kingdom waived the payment of £2.755 million ($7,714,000) due for property turned over to Iraq on condition that the latter devote at least £2 million ($5,600,000) in 1956 and 1957 to the purchase in the United Kingdom of arms, equipment, and defense stores and apply the remainder to expenses connected with the training of Iraqi forces. (Commonwealth Survey, vol. 1, No. 7, April 6, 1955, pp. 317–322; Washington Post, December 22, 1955, p. 7.)

Tanks, jeeps, and other military equipment were delivered at Basrah in November 1956 as part of the overall order which is reported to include a squadron of Hawker Hunter jet planes. (Washington Post, November 20, 1956, p. A. 9; New York Times, January 3, 1957, p. 3.)

[77] Up-to-date jet planes, together with other military supplies, have been requested from the United States under the military assistance agreement reached in April 1954. (Department of State Bulletin, vol. 30, No. 777, May 17, 1954, pp. 772–773; New York Times, January 14, 1955; January 3, 1957, p. 3.) Deliveries of military supplies have included vehicles, engineering equipment, antiaircraft guns and tanks, and large quantities of ammunition. (New York Times, November 27, 1956, p. 1; Report to Congress on the Mutual Security Program for the 6 months ending June 30, 1956, pp. 5–6.)

[78] New York Times, January 3, 1957, p. 3.

[79] New York Times, February 26, 1956. Hanson Baldwin stated after a field survey at the end of 1956 that Jordan's armed forces consisted of 1 division of about 18,000 men (the former Arab Legion) and 44 battalions of national guard, many of these under strength. This would appear to constitute a total military force of possibly 40,000.

[80] Christian Science Monitor, October 22, 1956, p. 2.

[81] New York Times, May 23, 1956, p. 4.

[82] New York Times, January 3, 1957, p. 3.

[83] New York Times, March 3, 1957, p. E3.

armaments of the major powers. Such an achievement would undoubtedly redound to the interests of all peoples of the world, including those in the Middle East.

While the tensions in the Middle East are by no means entirely the result of tensions between the Communist and free world, there is no doubt that conflicting aims of the major powers aggravate the Middle Eastern problems and inhibit their solution. The armaments and armed forces of the major powers have already played a large part in determining the course of events in this area. British and French forces invaded Egypt. The Soviet threat of sending "volunteers" to help Egypt and of using missiles against Great Britain and France if they did not withdraw their forces from the Middle East was a sober reminder of Soviet willingness to hinder rather than aid in the peaceful solution of international disputes. The involvement of the military forces of all the major powers is rounded out by the request of President Eisenhower of January 5, 1957, for congressional authorization to use American Armed Forces if necessary to aid in the defense against Communist aggression and if such action is consonant with the United Nations Charter.[84] Thus, any international agreement bringing about the reduction or control of armaments and armed forces of the major powers would appear to have a direct impact on the security of the Middle East.

Outside of the effects which would be derived from the control of armaments and armed forces of the major powers, present disarmament approaches would appear to have little direct bearing on the Middle East. None of the Middle Eastern states has armed forces sufficiently large to be affected by ceilings on the forces of small powers currently being suggested. They are all normally under the 150,000 to 200,000 ceiling suggested by the Soviet Union as well as the 500,000 limit suggested in a working paper by the United States.[85]

The proposal bearing most directly on the Middle East is that of the Soviet Union to liquidate within two years foreign military, naval, and air bases.[86] Recently this has been proposed specifically for the Middle East.[87] The West now has access to bases in Cyprus, Turkey, Gibraltar, Malta, Aden, Bizerte, Libya, and Saudi Arabia which are related to the defense of that area. The Soviet Union does not have such bases, but since it borders on Turkey, Iran, and Afghanistan, the Soviet proposal would mean the dismantling of Western defense bases while the location of Soviet bases for possible aggressive action would not be changed.

Control of atomic energy

At the present time, none of the Middle Eastern states produces nuclear weapons and none is known to possess them. The Middle East would be directly affected by the use of nuclear weapons only if any of the three states now possessing such weapons—the Soviet Union, the United States, and the United Kingdom—used them in the Middle Eastern area, or close enough that the area would be contaminated with radioactive fallout.

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[84] New York Times, January 6, 1957, p. 1.
[85] United Nations Document DC/83, May 4, 1956.
[86] New York Times, November 18, 1956, p. 33.
[87] Soviet proposal of February 12, 1957 (New York Times, February 13, 1957, p. 4).

Recently, however, the awareness that the capability of making nuclear weapons cannot be confined within the boundaries of the three nations now producing them has caused concern over the so-called fourth-country problem. Unless effective control measures are devised in the near future, it is reasonable to assume that eventually a fourth country, and probably many additional countries, will be able to produce or acquire and stockpile nuclear weapons.

Safeguards have been incorporated in the Statute of the International Atomic Energy Agency and the United States atoms-for-peace program, designed to help other nations develop atomic energy for peaceful purposes, to insure that none of the materials supplied through them will be diverted to the production of weapons. As the various nations gain in skill, however, they will be more able to undertake a weapons program of their own which, at the present time, would not be subject to international control. In this connection it should be pointed out, however, that since knowledge is not confined to national boundaries, some nations are likely to achieve this ability without outside help. While international aid may hasten this process, it also establishes the nucleus of a control system which would not otherwise exist.

The fourth-country problem is related to the Middle East, and other regions, in that if any country in the area were to have nuclear weapons at its disposal, the military-strength ratio within the area, as well as throughout the world, would be greatly altered. Any arms-control plan which had been devised without preparation for this contingency would become to some extent out of date.

The probability of additional nations developing atomic weapons would appear to depend on many factors. An adequate scientific and technical community would have to exist to furnish the nuclear scientists, engineers, and skilled technicians. In addition, the production of atomic weapons would require financial and industrial resources, as well as access to essential raw materials.

At the present time these requirements are generally lacking in the Middle East, although they do exist to some extent in Israel. That country has many skilled scientists and technicians. Moreover, natural uranium is widely distributed and has already been found in Israel. It may exist in other Middle Eastern countries although adequate exploration has not been undertaken outside Israel.

The International Atomic Energy Agency, which would aid in the development of atomic energy for peaceful purposes, has not yet come into being. However, the United States has or is in the process of negotiating bilateral agreements with Iran, Israel, and Lebanon on the exchange of information and materials for research purposes, and will supply radioisotopes for peaceful uses to any country in the area requesting them. In addition, preliminary discussions have been held with Israel regarding a more extensive agreement concerning operations in the power field, which would make her eligible for greater quantities of fissionable material for use in power reactors. As has already been pointed out, all the bilateral agreements of the United

States have provisions to safeguard against any of the material supplied under them being used for any purposes other than peaceful.[88]

Regional approaches

Tensions in the Middle East between Israel and the Arab States exist independently of the worldwide conflict between international communism and freedom. The root of hostility lies in political factors and the institution of any system of armament control in the Middle East would not solve the political questions. Nevertheless, armament-control measures might contribute toward the reduction of tensions and thus toward achieving a more lasting peace in the area.

An armaments-control plan for the Middle East might also have the advantage of providing experience which could be applied to other areas of the world, including arrangements among the major powers. Whether such limited-control plans could be applied remains to be seen, but already examples exist to warrant making the attempt.[89]

Demilitarized and neutralized areas

One method of arms control that has been tried in the Middle East as a means of preventing hostilities is the establishment of demilitarized zones. The armistice agreements between Israel and the Arab States, concluded under United Nations auspices in 1949, provided that on both sides of the armistice demarcation lines there should be "defensive areas" in which the military forces of the armistice signatories would be limited in number, approximately equal in strength, and under fixed restrictions as to the weapons they might employ. In two relatively small areas "demilitarized zones" were created between the opposing sides—one zone in the vicinity of El Auja on the Israeli-Egyptian frontier and the other along the Israeli-Syrian border. In these zones military forces and fortifications were forbidden.[90]

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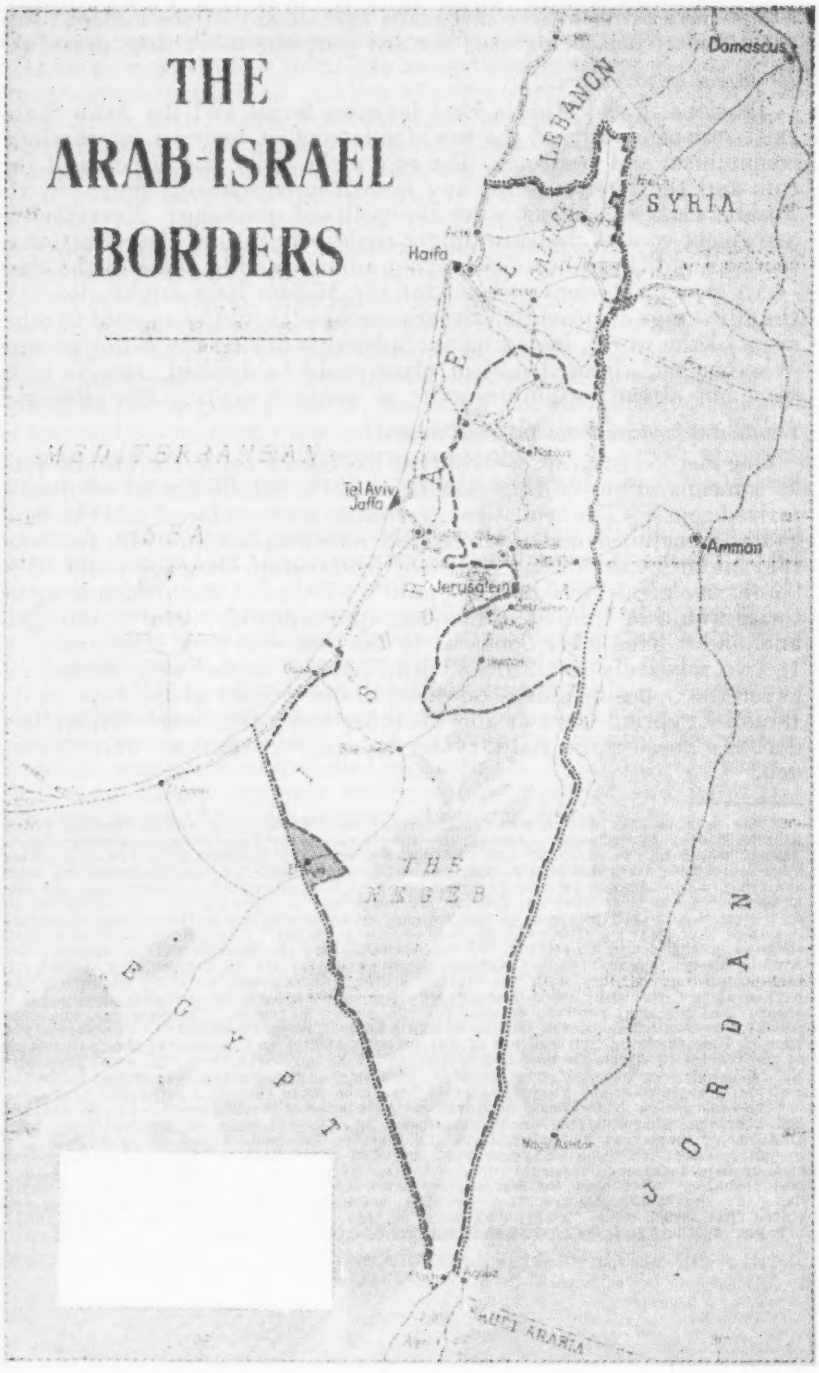
[88] The data in this section was secured from the International Affairs Division of the Atomic Energy Commission. Among the functions of the International Atomic Energy Agency would be "to establish and administer safeguards designed to insure that special fissionable and other materials, services, equipment, facilities, and information made available by the Agency or at its request or under its supervision or control are not used in such a way as to further any military purpose; and to apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement, or, at the request of a state, to any of that state's activities in the field of atomic energy." Specific methods of control, such as auditing and inspecting, are authorized. See the Statute of the International Atomic Energy Agency (United Nations Document IAEA/CS/13, November 1, 1956). In the bilateral agreements with the United States, governments receiving fissionable materials, as is required by the Atomic Energy Act of 1954, agree to maintain safeguards to assure that material received is used for the agreed purposes. The research bilaterals permit representatives of the United States Atomic Energy Commission "to observe from time to time the condition and use of any leased material and to observe the performance of the reactor in which the material is used (U. S. Senate, 84th Cong., 1st sess., Document No. 55, Atoms for Peace Manual, p. 374). Because of the greater quantity of fissionable material transmitted, the power bilaterals have even more extensive safeguard provisions.

[89] The inspection system used in Korea gave evidence of certain practices to be avoided. See hearings, Subcommittee on Disarmament, pt. 11, testimony of Arthur Dean. The planning of inspection and control for the Western European Union offers another case in point. See Collection of Documents, pp. 513–518. Such a regional approach has already been mentioned favorably in the United Nations by an Israeli delegate. He suggested that a "pilot plan" of disarmament and international inspection might be established in the Middle East by a convention between Israel and the Arab States, and stated that Israel would "gladly cooperate" in this (New York Times, January 26, 1957).

[90] For citations to texts of the armistice agreements, see footnote 27.


THE
ARAB-ISRAEL
BORDERS
Damascus
LEBANON
SYRIA
Haifa
MEDITERRANEAN
SEA
Tel Aviv
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Amman
Jerusalem
THE
NEGEB
EGYPT
JORDAN
SAUDI ARABIA

The purpose of these devices was to help insure observance of the armistice by reducing friction where the opposing military forces faced each other in the armistice frontier zones. They have not, however, been completely effectual in achieving their purpose. Instances have abounded of firing across the armistice lines and of raids and forays by each side into the territory of the other. One of the demilitarized zones has been occupied by the Israeli Army and in the other both Israel and Syria have put up fortifications.[91]

Proposals for new demilitarized or neutralized zones

After the United Nations in November 1956 called for a cease-fire in the Israeli-British-French invasion of Egypt and despatched an international emergency force to supervise it (UNEF—United Nations Emergency Force), several proposals were advanced for new methods of averting future tension on the armistice lines between Israel and Egypt. Many of these proposals called for the creation of demilitarized areas between the Israeli and Egyptian forces, and in some cases for neutralized or internationalized zones, that would be devoid of national armed forces or armaments. Much of the discussion in the United Nations has concentrated on two areas in particular, the Gaza strip—a long narrow band of land bordering the Mediterranean Sea between Israel and Egypt—and the territory adjacent to the Strait of Tiran leading into the Gulf of Aqaba. Before the invasion both of these areas had been held by Egypt.[92] Israel had been reluctant to withdraw its military forces from these two areas because one of them, the Gaza strip, had been used as a spring board for commando (fedayeen) raids against Israel and the other as a base for blockading the Israeli port of Elath on the Gulf of Aqaba.

In regard to the general armistice lines between Egypt and Israel[93] the United Nations on February 2, 1957, approved a resolution sponsored by the United States[94] calling for placement of UNEF "on" the armistice lines and recommending, by implication, that the demilitarized zone at El Auja be restored.[95] Differences have arisen, however, between Egypt and Israel on where the United Nations forces should be stationed. Egypt has demanded that the United Nations troops should be on both sides of the armistice lines,[96] whereas Israel has indicated it will refuse to allow UNEF on the Israeli side.[97]

Demilitarization and neutralization under the United Nations have been proposed as solutions for the problem of the Gaza strip. The United Nations Secretary General on February 22, 1957, suggested a plan whereby UNEF would take over control of the Gaza area from Israel and United Nations forces would be stationed on the armistice line as an effective interposition between Israeli and Egyptian troops. He further suggested that United Nations bodies take over police and civilian administration in the territory.[98] When

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[91] United Nations Security Council, Report of the Secretary-General * * * in the Palestine Question, September 12, 1956 (S/3659, September 27, 1956). For problems of inspecting and enforcement of the defensive areas and demilitarized zones, see p.293 ff.

[92] The Gaza area had originally been part of Palestine but was left under Egyptian military occupation as a result of the armistice of 1949. The territory along the Gulf of Aqaba is under Egyptian sovereignty. Two islands in the Strait of Tiran, key positions in the blockade of the Gulf of Aquaba, are under Saudi Arabian sovereignty but have been administered by Egypt.

[93] See map, p. 286.

[94] Other sponsors were Brazil, Colombia, India, Indonesia, Norway, and Yugoslavia.

[95] Text of resolution in New York Times, February 2, 1957.

[96] New York Times, February 3, 1957, pp. 1 and 21.

[97] New York Times, February 24, 1957, p. 7.

[98] New York Times, February 23, 1957, p. 2.

Israel on March 1 announced its military withdrawal from the Gaza territory it did so on the "assumption" that the Secretary General's plan would be carried out. The United States has also expressed favor for this plan.[99] Other nations have been reported as considering a proposal for making Gaza a United Nations trusteeship territory.[100] But Egypt's attitude is not clear. Although the Egyptian Government has allegedly expressed a willingness to cooperate with some United Nations bodies in the Gaza strip, it is not certain it would support completely the suggestions of the Secretary General.[101] A major point at issue is how long the United Nations should have responsibility in the Gaza area. Egypt has maintained that its stay should be only temporary,[102] whereas Israel maintains that it should remain until there is a peace settlement or a definitive agreement on the future of the territory.[103]

Proposals for demilitarization have also been made for the Gulf of Aqaba region. The United Nations General Assembly in its resolution of February 2, 1957, recommended that UNEF move into the area following an Israeli withdrawal. At the beginning of March the Israeli Government agreed to this recommendation and initiated measures to withdraw its forces.[104] At that time there was still uncertainty, however, as to what arrangement there would be on the length of time UNEF would remain in the region.

Some proposals made outside the councils of the United Nations are even more far-reaching. They call for an international buffer zone, under United Nations military occupation and supervision, not only in Gaza and at Tiran, but all along the Israel-Egyptian border.[105] Still another suggestion is that a new "state" should be carved out of the Sinai Peninsula and be placed under United Nations administration. According to this proposal the territory of the new "state" would be purchased from Egypt and it would serve not only as a buffer area but would also be a haven for refugees and possibly the site of an oil pipeline from the Red Sea to the Mediterranean.[106] The longstanding proposal for the internationalization of the city of Jerusalem would, if realized, also interpose a neutralized and demilitarized area on part of the boundary between Jordan and Israel.[107]

Acceptance by Israel and the neighboring Arab countries of demilitarized or neutralized zones along either all or part of their borders might lessen friction between them, and might be conducive to an eventual reduction of their overall armed forces and armaments. Although at the present time there appears to be agreement among the parties concerned that the United Nations Emergency Force

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[99] Texts of Israeli and United States statements are in New York Times, March 2, 1957: 10.

[100] Washington Post, February 25, 1957, p. A5.

[101] New York Times, February 23, 1957, p. 2; Washington Post, February 24, 1957, p. A4.

[102] See, e. g., New York Times, March 3, 1957, p. 7.

[103] New York Times, March 2, 1957, p. 10.

[104] New York Times, March 2, 1957, p. 10.

[105] "A United Nations buffer zone from Gaza to the Gulf of Aqaba, with an international force to police it, ought to be the minimum objective * * *." Editorial, Washington Post, January 15, 1957, p. A14.

[106] G. H. Dempster, The Sinai Desert, Christian Science Monitor, January 14, 1957, p. 16.

[107] In 1947 the United Nations General Assembly voted to establish an international regime for the city of Jerusalem under the United Nations. It reaffirmed this resolution in 1949 and in 1950 the United Nations Trusteeship Council approved an international statute for the city providing for its neutralization and demilitarization. The statute was never put into effect. See Constantine Rackauskas, the Internationalization of Jersualem. Washington, Catholic Association for International Peace, 1956.

should have a function as a separating and enforcement agent on the Egyptian-Israeli armistice line, there is disagreement whether it should be deployed along one or both sides of the line and how long it should stay. There is even a wider divergence of views on the role of the United Nations or its emergency force in the Gaza and Gulf of Aqaba areas. The extent to which the principle of neutralization or demilitarization will be approved in international negotiations currently underway in the United Nations and elsewhere is not clear at the present time.

International control of the arms traffic

One method of arms control which has been proposed, and to some extent already tried, for the purpose of maintaining peace in the Middle East is the regulation of arms traffic. The general problem of controlling the international traffic in arms is one of some years' standing and was dealt with in the period between the two world wars. Then arms trade was carried on by both governments and private munitions manufacturers or commercial agencies. Much of the effort in the interwar period to regulate the international arms traffic was directed at controlling the private commerce in weapons and munitions. In the 1920's two international conventions were concluded providing for national licensing of and publicity for arms exports, but neither of them came into force.[108] However, most countries that produced arms adopted some kind of license requirements. At the end of World War II the sale and export of arms, at least as far as the major powers were concerned, was either in the hands of governments or largely under government regulation. There was, however, no international system for the regulation of the armaments trade.

Tripartite regulation in the Near East

After the armistice of 1949 brought to a halt full-scale war between Israel and the neighboring Arab States, the United States, Great Britain, and France, in the absence of a general international system for regulating the armaments traffic, adopted a joint policy of regulating arms shipments to the Middle East. In 1950 they issued a declaration stating:

> The three governments recognize that the Arab States and Israel all need to maintain a certain level of armed forces for the purposes of assuring their internal security and their legitimate self-defense and to permit them to play their part in the defense of the area as a whole. All applications for arms or war materials for these countries will be considered in the light of these principles. In this connection * * * [they reaffirm] their opposition to the development of an arms race between the Arab States and Israel.
>
> The three governments declare that assurances have been received from all the states in question. * * * that the purchasing state does not intend to undertake any act of aggression against any other state. Similar assurances will be

[108] The Convention of St. Germain of 1919 and the Convention of Geneva, 1925. The United States signed both conventions but ratified only the second. See Murray Stedman, Export Arms, The Federal Arms Exports Administration, 1935–45, New York, Kings Cronin Press, 1947, p. 4.

> requested from any other state in the area to which they permit arms to be supplied in the future.[109]

In accordance with this declaration, the three powers sought to regulate their arms shipments so as to avoid a serious imbalance of strength between the adversaries as well as an arms race, and also to enable all of the states concerned to develop their armed forces to the point which would help to deter aggression from other quarters.

However, control of arms shipments to the Middle East was not exclusively in the hands of the three major Western Powers.

Small powers have also supplied armaments. Israel reportedly has received arms from Czech and Canadian sources at one time or another, and the Arab States have been supplied by sources in Italy, Switzerland, Belgium, Canada, and Spain. But these countries were not in the same position to supply large quantities of heavy equipment as were the three Western Powers and the Soviet Union. In 1950 when the three Western nations made their declaration, political conditions were not propitious for the Soviet Union to act as a purveyor of armaments to the Middle East. Consequently control of the arms supply to the middle eastern area was largely under the effective control of the three Western Powers.

The arms traffic problem since 1955

But when the Soviet Union entered the scene in 1955 as a major arms supplier to one side of the Israeli-Arab controversy, Western policy was not only circumvented but a dilemma was posed for Western policymakers, whether to permit the Communist trade to strengthen one side to the serious peril of the other, or whether they themselves should initiate steps to strengthen the other side and thus risk touching off an arms race that might lead to war.

On the same day that Egypt announced its arms arrangement with the Soviet bloc—September 27, 1955—the United States and Great Britain promptly reaffirmed their declared policy on arms shipments to the Middle East countries. A joint statement issued by the United States and British Governments said that—

> Both governments base their policies on the desire, on the one hand to enable the various countries to provide for internal security and for their defense, and on the other to avoid an arms race which would inevitably increase the tensions in the area. They will continue, and hope other governments will continue, to be guided by these principles.[110]

To this statement the French Government officially adhered 2 days later.

Later, in a statement of November 9, 1955, President Eisenhower specifically confirmed that the tripartite declaration of May 25, 1950, was still the policy of the United States and he added:

> While we continue willing to consider requests for arms needed for legitimate self-defense, we do not intend to contribute to an arms competition in the Near East. * * *[111]

The aim of preventing an arms race, although it did not preclude limited deliveries of weapons to Near Eastern states, did require a

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[109] Collection of Documents, p. 631.
[110] Department of State Bulletin, October 10, 1955, p. 560.
[111] Department of State Bulletin, November 21, 1955, p. 845.

close review of requests for large shipments.[112] When Israel requested arms to the value of at least $50 million to offset the weapons deliveries to Egypt from the Communist bloc, the United States Government did not approve the request.[113] Secretary of State Dulles asserted that the security of Israel could better be assured by means other than an arms race and that the protection afforded by the United Nations Charter and the tripartite declaration of 1950 "is a far more effective deterrent to any potential aggressor than any amount of arms which could be obtained by either side." [114]

Another reason for the refusal of the Western Governments to permit a large shipment of armaments to Israel was indicated by British Foreign Secretary Selwyn Lloyd who in July 1956 maintained that the balance of arms in the Middle East was "rather in favor of Israel," [115] a point of view which was, however, disputed by Israel.

In two instances in 1956, the United States departed from a strict interpretation of its arms trade policy in regard to Israel.[116] Administration officials were reported as feeling that since the United States had rarely shipped arms to the Near East it would be considered as contributing to an arms race if it did so but that this would not be the case with countries which were traditional suppliers of arms to that area.[117] In September 1956, the State Department, in what was described as a lifting of the freeze on "routine" shipments of arms to Israel permitted some military articles to go to that country.[118] The United States policy of strictly restricting arms shipments to the Middle East was not changed by the British-French-Israeli invasion of Egypt in the fall of 1956. The United Nations resolution of November 2, 1956, urging a cease-fire recommended that all member states refrain from introducing military goods into the "area of hostilities." [119] In January 1957, the Secretary of State declared that it had not been the policy of the United States to send arms to Israel or its neighbors, and that arms had been sent to the Middle East, only in small amounts. He indicated that future shipments of arms were subject to subsequent decision.[120] A month later the United States agreed to supply military equipment, services, and training to Saudi Arabia.[121]

The arms traffic in Algeria

Another aspect of the arms trade question in the Near East is the traffic that has allegedly occurred between Egypt and the insurgents in

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[112] See official State Department statement on shipping tanks to Saudi Arabia (New York Times, February 1956, p. 2). After a brief suspension of the export license the United States permitted a shipment of 18 tanks to go to Saudi Arabia in February 1956.

[113] Israel formally requested the United States to sell her arms on November 16, 1955, and repeated the request on subsequent occasions. The value of the arms requested was placed by the Pentagon at $50,000,000, although at other times it was reported in the press as $63,000,000. (See Washington Post, December 11, 1955, p. A10.)

[114] Letter of February 6, 1956, to 40 Members of Congress (Congressional Record, February 9, 1956, p. A1304–A1305 (daily)).

[115] Washington Post, July 3, 1956, p. 5; July 25, 1956, p. 4.

[116] The United States gave informal approval to the sale of 24 jet fighters by France to Israel in April and May (New York Times, May 13, 1956, pp. 1–2) and to the sale of 24 additional jet aircraft by Canada to Israel in September (New York Times, September 22, 1956, p. 1).

[117] New York Times, April 3, 1956, p. 3. In London "officials" were reported as having said that Big Three were permitting a "coordinated trickle" of arms to Israel as part of the policy of maintaining a balance of power in the Middle East. Washington Post, May 13, 1956, p. 1.

[118] Washington Post, September 26, 1956, p. 1.

[119] See above, p. 14. The term "area of hostilities" apparently included only those areas where military operations were actually in progress.

[120] New York Times, January 8, 1957, p. 8.

[121] See footnote 9, p. 6.

Algeria. On October 29, 1956, France requested the United Nations Security Council to discuss the "military assistance rendered by the Egyptian Government to the rebels in Algeria." The French representative asserted that the *Athos*, a ship from Egypt bearing arms and munitions for Algerian rebels, had been intercepted by French forces off the Algerian Coast on October 16. France charged that the facts clearly showed the responsibility of the Egyptian Government for the arms shipment.[122] The Security Council has not yet set a date for further discussion of the French complaint.

Methods of controlling the arms trade

In general, any attempt to regulate effectively the arms flowing into the Middle East would have to deal not only with armaments supplied directly by governments, or by private sources under government supervision, but also from those private sources not under effective government regulation. It would have to cope with the possibility of arms shipments from many countries, including members of free world alliances, neutral states, and the Communist bloc. Unless the Middle Eastern states themselves would agree to limit the amount of arms they received from outside sources, any attempt to control armaments levels through regulation of the arms traffic would apparently need to take account of at least all the large arms-producing states, plus any states which might transship arms supplied to the Middle East. The traffic could presumably be controlled either at the source or at the destination. Control at the source would require the willingness and participation of at least all states now supplying arms to the Arab States and Israel. Control at the destination would appear to be more difficult from the point of view of international enforcement, for it would involve having an international agency with authority to turn back or confiscate arms shipments if they exceeded the recipient state's quota. Whatever the method of regulating the arms traffic, it would appear necessary for those carrying it out to decide on the level of armaments which would be permitted, and, subsequently, to have reasonable assurances that surreptitious arms shipments were not being received which would throw the arms levels off balance.

Proposals for controlling the arms trade in the Middle East

One proposal for coping with the problem of the armaments trade in the Middle East and elsewhere is that the United Nations establish a body to study the arms traffic problem and make recommendations regarding its regulation.[123] Other proposals have suggested the imposition of an international embargo on arms shipments to the Middle East.[124] The U. S. S. R. has expressed a willingness to cooperate in a general arms embargo under the United Nations,[125] and has proposed that the United States, Great Britain, France, and the U. S. S. R. jointly refuse to supply arms to the countries of the Middle East.[126]

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[122] United Nations Review, December 1956, p. 3. French Embassy press release, October 29, 1956.

[123] Testimony of John C. Elliott before the Senate Subcommittee on Disarmament, January 17, 1957. See also the New York Times, January 30, 1957, p. 10.

[124] The British Labor Party and Premier Guy Mollet of France have made such suggestions. New York Herald Tribune, November 23, 1955, p. 2; New York Times, March 25, 1956, p. 1.

[125] Nikita Khrushchev, U. S. S. R. Communist Party chief, made such a statement at the conclusion of talks with British leaders in April 1956. New York Times, April 28, 1956, p. 1.

[126] New York Times, February 13, 1957, pp. 1 and 4.

The United States, Great Britain, and France on March 11, 1957, rejected this proposal. Such a proposal, if it were adopted, would probably affect arms aid by the Western Powers to some or all the members of the Baghdad Pact in the Middle East, as well as to other nations in that area which might be scheduled for military assistance under Middle East-Western defense plans. Moreover, since the Government of Communist China is not represented in the United Nations, it might become a loophole that would render ineffective an embargo imposed by the international organization.[127]

Still another proposal is that all arms shipments to the Middle East and elsewhere be registered and published by the United Nations.[128] Before World War II the League of Nations published an annual statistical survey of the international trade in arms based on official data furnished by member states,[129] but the United Nations has not continued this practice. An international reporting and publication system would not of itself terminate or limit arms shipments, but it would throw a spotlight of international publicity on a subject now frequently shrouded in secrecy. Without some system of international verification, however, the purposes of an international reporting arrangement could readily be thwarted by nations not acting in good faith.

Inspection and control

A basic element in a disarmament system, inspection and control, has been in existence in the Middle East since 1949. The Israeli-Arab armistices, signed then, established a supervisory system designed to prevent the recurrence of major warfare. The supervisory system consisted of 4 separate mixed armistice commissions, 1 for each agreement, composed of 2 representatives of each party (except in the case of the Egyptian armistice which provided for 3 representatives of each party) with a United Nations chairman for each commission.[130] In addition, the United Nations Truce Supervision Organization, a body of neutral observers originally set up to supervise the truces which preceded the armistices, was retained to assist the mixed armistice commissions. Questions were to be decided unanimously, if possible, but otherwise by majority vote. This made the vote of the chairman decisive in issues between the parties. An appeal system provided ultimately for taking a dispute to the Security Council.

Complaints of violation were to be lodged with the respective mixed armistice commissions, which would take such action as it deemed appropriate, using its observation and investigation machinery. Members of the commissions and their observers were to be accorded freedom of movement and access in the areas covered by the agreements. The United Nations Chairman of the Mixed Armistice Commission and United Nations observers attached to the Commission were also to be responsible for the demilitarized zones established in the Syrian and Egyptian armistices with Israel.

In practice, while these measures undoubtedly aided in maintaining the armistices and decreasing hostilities, "incidents" and charges of

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[127] This thought is reported to have motivated Egyptian recognition of Communist China in May 1956. New York Times, May 19, 1956, p. 2.

[128] Testimony of John C. Elliott before the Senate Subcommittee on Disarmament, January 17, 1957.

[129] Statistical Year Book of the Trade in Arms and Ammunition.

[130] The United Nations Chief of Staff of the Truce Supervision Organization was made ex officio chairman of the commission.

violation of the armistices against all parties occurred almost continuously.

The Truce Supervision Organization was handicapped by deficiencies in personnel, equipment, and communications. Even more importantly, "The so-called freedom of movement of observers has even had to suffer from new restrictions and the conditions under which they have had to operate have deteriorated," [131] in spite of Security Council declarations to the effect that full freedom of movement by United Nations observers must be recognized.

Moreover, the defining of responsibility for breaches of armistice agreements was made difficult because little cooperation was given from the party or parties to the offending action. Guilt, when determined, was dealt with only by calling upon the offending state to take measures to prevent recurrence of such incidents.

In every year except 1952, some complaints, which had not been resolved by the mixed armistice commissions, were taken to the Security Council. Such appeals only led to admonition by that body. Security Council resolutions undoubtedly had some restraining influence on occasion, as when Israel agreed to stop work on the draining of the Huleh marshes in 1951; but in other instances, such as when the Security Council in 1951 called upon Egypt to remove its restriction on Israeli shipping through the Suez Canal, United Nations resolutions went unheeded. In 1954 the Soviet Union began to veto some of the measures for aiding in the enforcement of the armistices. Prior to that time Palestine had been one of the few areas in which the Security Council had been able to take action unfettered by the veto.

For some time it has been recognized that the armistice agreements had serious limitations in view of the unwillingness of the parties to observe them scrupulously. After the armistices had functioned for 4 years a United States report stated:

> The year 1953 saw the development of disturbing indications that the bilateral general armistice agreements between Israel on the one hand and Egypt, Jordan, Syria, and Lebanon on the other might well be proving inadequate for the maintenance of peace and stability in the Palestine area.[132]

Another of the main problems in maintaining the armistice agreements was that each side conditioned compliance with the armistice agreement on reciprocity by the other side. A breach by one side was frequently considered by the other as justification for retaliation. This upward spiral of incidents continued even though acts of retaliation were repeatedly condemned by the Security Council.

To prevent this chain reaction from resulting in a complete breakdown of the armistices, in 1956, through the good offices of the United Nations Secretary General, the parties agreed to establish an independent status for the cease-fire obligations of the armistice. Under this no party could legally justify a violation by reference to an alleged noncompliance by other parties to some other part of the armistice.[133]

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[131] Report of the Secretary General to the Security Council. Pursuant to the Council's resolutions of April 4 and June 4, 1956, on the Palestine question. S/3659, September 27, 1956, p. 7.

[132] United States Participation in the United Nations, Report by the President to the Congress for the year 1953, p. 74.

[133] Report of Secretary General to the Security Council, September 22, 1956.

Nevertheless, all the provisions of the armistice agreement increasingly were rendered less and less effective.

One weakness of the inspection system initiated to insure observance of the Israeli-Arab armistices appears to be that inspection was geared mainly to the investigation of incidents after they occurred. Inspection on a continuing basis with the primary object of preventing incidents or attacks was not established.

The establishment of a more comprehensive inspection system in the Arab-Israeli area might decrease tensions if each side could be assured through such a system that it was not in danger of surprise attack and that the other side was observing its armistice obligations. If any system of arms control was established, it would also serve the purpose of detecting violations of the agreement. Methods of inspection which have been proposed for a disarmament agreement include aerial inspection, ground inspection, budgetary inspection, and combinations of these.

An inspection system, however, would not appear to be adequate to maintain peace in the Middle Eastern area unless it was accompanied by some sort of machinery for effectively dealing with any potentially dangerous situation which was revealed by inspection. In the last analysis, it was not so much the mechanics of the inspection system that was at fault in the failure of the United Nations to prevent the buildup of Middle East tensions and animosities as it was the absence of any overall authority capable of enforcing its decisions in the interest of the world community that resulted in the crises of late 1956.

Even in the past there has frequently been forewarning of danger and knowledge of armistice violations of the type that would be revealed through an inspection system. For example, before its attack on Egypt, Israel announced that it had mobilized its reserves and stationed them along the borders of neighboring Arab States. President Eisenhower sent an urgent message to Israel recommending that no forceful initiative be undertaken, and Americans in the area were asked to leave. However, in spite of the knowledge of mobilization the attack was not prevented. Similarly, it has been known that fortifications were being constructed in the demilitarized zones in violation of the armistice agreements and that Egypt was blocking Israeli shipping from the Suez Canal in violation of a Security Council decision. Nevertheless, these practices were not halted. In all of these cases the problem was not lack of knowledge as to what was occurring, but rather the lack of measures to prevent or stop undesirable practices.

The establishment of the United Nations Emergency Force to secure and supervise the cessation of hostilities between Israel and Egypt has given rise to proposals for broader functions for the police force.[134] It has been suggested that the United Nations force should stay in the area to separate Arab and Israeli forces, supervise whatever agreements might be reached, and generally prevent the recurrence of hostilities. The guiding principles for the emergency force approved on November 7, 1956,[135] limited the force to operations on the territory of states which had given their consent to its presence there,

[134] New York Times, January 27, 1957, p. 22.
[135] See U. N. Doc. A/Res/395, November 8, 1956, and A/3302, November 6, 1956.

although "this does not exclude the possibility that the Security Council could use such a force within the wider margins provided under chapter VII of the United Nations Charter." [136]

The problem of defining aggression

When Israeli forces penetrated into Egyptian territory in October 1956, Egypt accused Israel of armed aggression, whereas Israel claimed that Egypt had been committing aggression by sponsoring fedayeen raids on Israel and attempting to stifle Israel economically.[138]

In its resolution of November 2, 1956, the General Assembly noted that on many occasions the parties to the Israel-Arab armistice agreements of 1948 disregarded the terms of such agreements, and "that the armed forces of Israel have penetrated deeply into Egyptian territory in violation of the general armistice agreement between Egypt and Israel." [139] The defining of aggression has also arisen in the British-Yemeni dispute over hostilities along the borders of Aden. Yemen has accused the United Kingdom of aggression there [140] whereas the United Kingdom has claimed that it was Yemen that was instigating the border attacks.[141]

The problem of what constitutes aggression is related to the control of armaments. If any arms-control agreement were reached the problem might arise of whether a party was violating the agreement or was engaging in aggression which justified another party's release from its arms-control obligations. For several years the United Nations has considered the possibility of defining aggression so that the definition could be applied in any instance in which it was necessary to determine whether aggression had been undertaken.[142] However, agreement as to the possibility, desirability, and content of a definition of aggression has not been reached in spite of long debate on the subject. The United States has taken the position that:

> There are obvious dangers in *a priori* paper definitions. A formula may be intended as a complete statement of what constitutes aggression, and yet the formula may fail to include mention of one or more types of conduct which would in fact be aggressive. In this way a potential aggressor would be effectively invited to pursue paths which seemed unwittingly to have been licensed by the community of nations. * * * No constructive purpose would be served at this time by the preparation of a formula to define aggression.[143]

The defining of aggressive actions continues to be treated as a problem to be solved in each instance according to the circumstances of the case.

G. CONCLUDING OBSERVATIONS

In the present situation in the Middle East there is much to give cause for alarm and for a reevaluation of policy. The political problems which prevent the achievement of a stable peace between Israel

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[136] A/3302, p. 4.
[138] New York Times, October 31, 1956, p. 8.
[139] A/Res/390, November 5, 1956.
[140] New York Times, January 11, 1957, p. 3.
[141] New York Times, January 13, 1957, p. 4.
[142] See Draft Report of the 1956 Special Committee on the Question of Defining Aggression, United Nations Document A/AC.77/L.12, November 1, 1956.
[143] Department of State Bulletin, December 6, 1954, pp. 872–873.

and its Arab neighbors are by no means near solution. The Soviet Union has thrust itself into controversies of the Middle East and expects thereby to emerge as a powerful influence in the area. A reliable security system to forestall and inhibit the aggressive and subversive designs of international communism has not yet been thoroughly developed. The role and authority of the United Nations to maintain peace in the area is still not fully defined and the members of that body remain divided as to policies to be pursued. The unity of action regarding the Middle East that once prevailed between the United States and Britain and France has deteriorated.

The main basis for hope lies in the fact that the Western Powers and the nations of the Middle East appear to have realized the need to make a renewed and persistent effort to remove both the immediate and the fundamental causes of tension and war. It is obvious that a solution to the fundamental problems will be many years in coming. The hostility between Israel and the Arab States cannot be wiped out overnight.

One question that arises in such a situation is whether methods of armaments control and limitation should be instituted. If an arms race adds to the likelihood of war, if the forces of the two sides in the Israeli-Arab feud should be physically separated, if there must be guaranties to prevent raids and to establish freedom of communication and transit, then limited armaments control measures may provide an essential contribution toward the establishment of a more permanent peace for the nations of the Middle East. The control of arms traffic, the creation of demilitarized areas, and the installation of a system of inspection and enforcement might be ways to eliminate the possibility of war breaking out and thus provide a longer period of peace to allow nations to work out their differences.

On the other hand, the conflict between the Arab States and Israel is not the only security problem facing the area. The threat of Soviet penetration and aggression is no less of a problem. The means to counteract this threat may not in the immediate future relate to disarmament, but, rather, may call for increasing the armaments of some Middle East nations. They may call for additional alliances and more definite security guaranties. The need to provide for two types of security—one against Soviet aggression and the other against Arab-Israeli conflict—may involve different policies which will be difficult to reconcile. At the present time it is uncertain whether such a reconciliation is possible.

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DISARMAMENT AND SECURITY IN LATIN AMERICA

STAFF STUDY NO. 7

MAY 12, 1957

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PREFACE

By Senator Hubert H. Humphrey

For many years the major powers of the world have been engaged in a search for ways to control and reduce their armaments and armed forces. Representatives of the United States and other governments have spent a great deal of time in submitting, examining, and negotiating numerous proposals dealing with armaments, inspection, enforcement, and more effective machinery for insuring peace. What has not been done is to examine sufficiently what has worked in the past and, consequently, what might work today if modified to fit present day conditions.

As this study on disarmament and security in Latin America shows, in our own hemisphere there exists considerable experience which should be brought to bear on future attempts to control and limit the weapons of war. For a long period the 21 Republics of the Western Hemisphere have cooperated in a system of interregional security which is one of the most highly developed the world has ever known. This system, based on the sovereign and independent status of each member nation, recognizes that security cannot be guaranteed by each state acting alone. The American states, therefore, have developed machinery by which various types of controversies may be subjected to peaceful settlement.

The Inter-American Treaty of Reciprocal Assistance of 1947 and the Charter of the Organization of American States, adopted in 1948, are the two basic documents which bind the American Republics together in formal agreement. Since they went into effect no nation in the area has been successful in imposing its will on another by force of arms. With few exceptions, when disputes have arisen an amicable settlement has been made through prompt use of the inter-American peace machinery, or if armed conflict has broken out, the regional defense treaty has operated to help end the warfare.

It is important to note that the success of the inter-American system does not rest on the absence of political disputes among the nations of the area. As in every area, some grievances of long duration remain; certain boundary disputes have not been settled; and economic rivalry persists. Therefore, it is not the lack of political and economic problems which is responsible for hemispheric peace. It is the creation of a system of handling disputes peaceably and the determination by the member nations to make the system work that give the Americas their admirable record.

The rest of the world—the major powers particularly—might examine the Latin American experience more carefully than they have. Those who agree that all political problems must be solved before a reduction can be made in armaments are as unrealistic as those who say disarmament can come about without regard to the presence of international tensions. We cannot expect to eliminate all political problems for all time. We can, however, strive to build

a system whereby the political problems which do arise are solved by peaceful means rather than through the use of military force.

Other lessons can be learned from the operation of the inter-American system. It is the only regional system which provides machinery for handling disputes within the area. Other regional security systems might examine the extent to which the machinery developed in the Americas could be incorporated into their own systems.

The inter-American system, although it is not primarily a military alliance, does have military features. The United States, under the mutual security program, sends a substantial amount of military aid to individual Latin American nations, but there is some question that this aid is being supplied with a proper awareness of its implications.

The executive branch must be careful that military aid sent to Latin American nations does not promote an arms race. Nor should military aid detract from important programs of economic development and technical assistance. What we give to one nation for hemispheric defense may provoke demands by another for an equal amount of aid. This danger is particularly acute since little appears to have been done to integrate the defense functions of the separate countries. If greater attention were given the coordination of military policy and functions, it might result in a decrease in the amount Latin American nations need to supply their individual military establishments. Such a step might also lessen the possibility for arms competition among the several countries and, in turn, might enable more energy and resources to be channeled into constructive measures to increase living standards and develop Latin American economies.

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MAY 12, 1957.

INTER-AMERICAN TREATY OF RECIPROCAL ASSISTANCE

In addition to region defined in article 4, treaty provides for action in event of armed attack "within the territory of an American State" (par. 3, art. 3) which includes more than continental territory of signatories. It includes the islands of Hawaii, Guam, and any other possessions abroad, since they all constitute part of the "territory of an American State."

DISARMAMENT AND SECURITY IN LATIN AMERICA

A. Introduction

The security of the Latin American Nations has been of concern and interest to the United States ever since they achieved their independence in the early 19th century. The vast territory of Latin America, with its large supplies of vital raw materials, affected United States national security long before this country found it necessary to be involved in the security of nations in other geographical regions. When the United States was endeavoring to isolate itself from the conflicts and problems of Europe and Asia it maintained at the same time a keen awareness of what was happening to the south of its border.

The inter-American system of security preceded other existing regional security systems. Indeed, its foundations had been laid before the creation of the United Nations and, in fact, the presence of a regional security system in the Americas influenced in several significant ways the drafting of and philosophy behind the United Nations Charter.

This study reviews the evolution, organization, and effectiveness of the inter-American security system and relates them to broader problems of disarmament and security in the present nuclear age. Much of the development of the inter-American security system may have relevance to the problems of disarmament and security on the larger world scene. Latin America is the only region in recent years which has not been the center of armed conflict of major proportions. That it has not may be of significance as all nations try to devise means of preventing a third world war.

B. Background of the Inter-American Security System

The 20 Republics of Latin America achieved their independence from colonial status not too many years after the United States. As young republics in a new world they were faced with the problem of maintaining their self-governing existence. As the Latin American nations grew and developed they had to meet three main challenges to their individual national security.

FACTORS INFLUENCING THE LATIN AMERICAN QUEST FOR SECURITY

The earliest and for many years the most persistent threat to the independence of Latin American nations was the threat of conquest from Europe. Latin American nations feared that Spain would attempt to recover her lost colonies. The new republics also felt that a reaction in Europe against ideas of popular sovereignty and constitutional and representative government would spill over to the new continent and an attempt would be made by such countries as Austria, Russia, Prussia, and France to exert domination and political control.

During the mid-19th century, when the United States was embroiled in civil war, the Latin American Republics actually experienced several temporary invasions of their territory. Napoleon III's

armies invaded Mexico and established a monarchy in that country for 3 years. Spain reincorporated Santo Domingo into its possession and seized the guano-rich Chincha Islands from Peru in 1864.

In the early 1900's Latin American nations again were threatened with intervention from European nations as a result of Latin American defaults on financial obligations to European governments and nongovernmental economic interests.

The pattern of periodic interference in Latin American affairs by countries of the old world had a profound effect on the early emergence of Latin American solidarity and the consciousness of the need for a regional security system.

FEAR OF THE COLOSSUS OF THE NORTH

Although the successful revolution of the 13 colonies in North America against Great Britain affected and abetted ideas of self-government in the Spanish colonies to the south, the emerging Latin American States developed a strong apprehension of the United States. As the United States was expanding to the south and to the west in the mid-19th century wave of "manifest destiny," Latin American nations feared that they too might become victims of the expansionist urge. Later, the United States caused considerable resentment by assuming the task of redressing European grievances in the Western Hemisphere.[1] This self-appointed police power on the part of the United States had the advantage of preventing intervention from Europe; however, it had the disadvantage of subjecting Latin American States to several acts of armed interference by the United States. United States military occupations occurred in Nicaragua in 1912 and 1926; in Haiti, 1915; and in Santo Domingo, 1916. United States military intervention in Latin America contributed to the desire of these nations to build a security system based on noninterference and sovereign equality.

INTER-AMERICAN DISPUTES

Occasional attempts to settle inter-American controversies by force of arms was a third important factor leading the Latin American nations to seek a system for the peaceful settlement of disputes. At various times throughout the history of Latin America the peace of the area was broken by small wars between two or more of the Republics. In the 1860's, for example, a chain reaction of armed conflict involved the invasion of Uruguay by Brazilian troops, the invasion of the Brazilian State of Matto Grosso by Paraguay, and a declaration of war by the latter on Argentina. Some of these disputes were of long duration and left a residue of animosity between the participants which has not to this day been completely obliterated.

EARLY EFFORTS TO ACHIEVE LATIN AMERICAN COLLECTIVE SECURITY

Since the threat of foreign domination occurred in Latin America immediately after the severance of Spanish control, the first efforts at collective security date back to the early existence of the Republics. Simon Bolivar, the revolutionary leader of Gran Colombia (present-day Colombia, Venezuela, and Ecuador), called a conference in Panama in 1826 for the purpose of establishing a confederation of the

[1] The announcement of United States intentions was given in the annual message from President Theodore Roosevelt to Congress, December 6, 1904. Gantenbein, James W. The Evolution of Our Latin American Policy, a documentary record. New York, Columbia University Press, 1950, pp. 361-362.

newly independent Republics. Members of the confederation would have been bound to come to each other's defense in case of attack. In addition, the confederation would have provided for a permanent congress which would meet periodically to arbitrate disputes between the members, to interpret treaties, and to serve as a point of contact in time of danger.[2]

Although the Congress of 1826 succeeded in drafting a treaty incorporating some of Bolivar's concepts, the treaty was never ratified by the required number of states. The Congress of Panama is looked upon, however, as the first step in the evolution of an inter-American collective security system.[3]

UNITED STATES PARTICIPATION IN HEMISPHERIC SECURITY

The basis upon which the United States sought to insure security in the Western Hemisphere for over a century was the Monroe Doctrine, first enunciated by President Monroe in 1823. The doctrine proclaimed the interest of the United States in the independence of Latin American States and, by implication, threatened the use of armed force if any nation from Europe attempted to interfere unduly in the affairs of the hemisphere.[4]

The Monroe Doctrine was a unilateral declaration. From the point of view of Latin America, it was considered effective in protecting the area against interference from Europe, but it did invite interference at times from the United States. Latin American States, therefore, became anxious to erect a security system based on the recognition of the independence of all the American Republics.

The United States began to acknowledge the need for an inter-American system when, on the initiative of Congress in 1888, it issued invitations to all Latin American countries to a conference to be held in Washington.[5] At this conference the United States participated with the Latin American countries in a joint endeavor for the first time. It opened an era of cooperation which culminated in the acceptance by the United States in 1933 of the principal that "no state has the right to intervene in the internal or external affairs of another." [6]

Thus, 100 years after Monroe and Bolivar set forth their own separately enunciated concepts of American security, these concepts were united in the declaration of all the American Republics of their common goals as independent and sovereign states.

During World War II and the years immediately preceding the war, the United States and Latin American nations held many consultations on how best to defend their territory from attack. The principle of consultation through meetings of the foreign ministers established a method of dealing with American security problems that was to form the basis of a more comprehensive inter-American system.

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[2] Argentina, although invited, held aloof from the proposed multilateral alliance. Whitaker, Arthur P. The Western Hemisphere Idea: Its Rise and Decline. Ithaca, Cornell University Press, 1954.

[3] The United States appointed observers to the conference but they were instructed to reject any proposal leading to a defensive or offensive alliance or any project for a superlegislature. Mr. Clay's instructions to United States Delegates to the Congress of Panama, May 8, 1826. In International American Conference, Vol. IV, Historical Appendix. Washington, U. S. Government Printing Office, 1890, pp. 113-151.

[4] Gantenbein. Op. cit., p. 324.

[5] Legislation and proposed legislation in the Congress of the United States referring to the International American Conference. International American Conference. Op. cit., p. 330. This conference, held in 1889, was the first of the conferences of the American states. To date, 10 such conferences have been held.

[6] At a special conference in Buenos Aires in 1936, the United States accepted unequivocally a protocol declaring "inadmissible the intervention of any one of them, directly or indirectly, and for whatever reason in the internal or external affairs of any other of the parties * * *" Additional Protocol Relative to Non-intervention. Gantenbein. Op. cit., p. 778.

C. Organization of the Inter-American Security System

After the 1944 conference at Dumbarton Oaks, where a postwar international organization was outlined, delegates from all the American Republics except Argentina met in Mexico City in 1945 to consider the future of the inter-American system. The resultant Act of Chapultepec recommended a reorganization of the American regional security system within the framework of the United Nations Organization. In addition, the act declared that every attack on an American state, from American as well as foreign sources, constituted an attack on all. Collective sanctions that might be taken to prevent or repel aggression were spelled out for the first time. [7]

THE INTER-AMERICAN TREATY OF RECIPROCAL ASSISTANCE

At Rio de Janeiro in 1947, delegates from the American Republics concluded the pact recommended at Chapultepec.[8] The Inter-American Treaty of Reciprocal Assistance, commonly called the Rio Treaty, established machinery by which the principle of collective action in America was to be implemented.[9]

Under the pact, the Organ of Consultation, consisting of the foreign ministers of the member states, is to agree upon those measures of a collective character deemed advisable to meet aggression or the threat of aggression. But to assure rapid action, the pact empowers the executive body of the Organization of American States to act provisionally as Organ of Consultation until the Meeting of Foreign Ministers can take place.[10] The various measures that may be contemplated are stated in article 8 as follows:

> Recall of chiefs of diplomatic missions; breaking of diplomatic relations; breaking of consular relations; partial or complete interruption of economic relations, or of rail, sea, air, postal, telegraphic, and radiotelephonic communications, and use of armed force.

A particularly notable innovation in the Rio Treaty is the formula for voting on what sanctions should be taken. During World War II the American Republics encountered the difficulty of securing unanimous consent among themselves; nor were the lessons of the veto in the United Nations Security Council lost on them. It was provided, therefore, that except in the case of the use of armed force, the decision reached by a two-thirds vote of the Organ of Consultation would be binding upon all parties, including those not concurring.

The Rio Pact defines a number of circumstances that could bring its provisions into operation. Article 4 carefully delineates a hemisphere defense region embracing both North and South America, including Canada and Alaska together with Greenland, the Aleutians, the Falkland Islands, and regions of the Arctic and Antarctic.[11]

Article 3 of the pact covers the case of armed attack within the defined region or within the territory of an American State. The

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[7] Inter-American Conference on Problems of War and Peace, at Mexico City, February 21 to March 8, 1945. Declaration and Recommendation VIII: Reciprocal Assistance and American Solidarity (the "Act of Chapultepec"). Gantenbein. Op. cit., pp. 816–819.

[8] For text of Rio Treaty, see: U. S. Congress, Senate Committee on Foreign Relations, Subcommittee on Disarmament, Disarmament and Security, A Collection of Documents, Washington, U. S. Government Printing Office, 1956, p. 649. Hereinafter referred to as Collection of Documents.

[9] The pact formally came into existence on December 3, 1948. All 21 American Republics are now members.

[10] Prior to 1948, the executive body was the Governing Board of the Pan American Union. After the Organization of American States was formed in 1948, the Governing Board was replaced by the Council which is composed of one member from each nation and which has been entrusted with executive and administrative functions for the entire inter-American system.

[11] See map, p. 304.

principle that an armed attack against an American State shall be considered as an attack against all the American States is specified. At the request of a victim of aggression, each member of the pact would take unilateral action to meet its obligations until the Organ of Consultation could agree upon collective measures.

Members of the pact recognized that situations other than armed attack might endanger the peace of the continent. Accordingly, article 6 provides for consultation whenever the territory, sovereignty, or the political independence of any American State is affected by (1) an act of aggression other than armed attack; (2) by an extracontinental or intracontinental conflict; or (3) by any other fact or situation that might endanger the peace of America. The broad scope of article 6 makes collective action possible before armed conflict breaks out. Article 6 has been successfully invoked on a number of occasions.[12]

In the event of conflict between two or more American States, article 7 instructs the Organ of Consultation to call upon the contending parties to suspend hostilities and restore the status quo ante bellum, and then to take the necessary measures for peaceful settlement of the conflict. If one of the contending parties rejects these calls, collective sanctions may then be agreed upon. To promote compliance with the call to suspend hostilities, article 7 stipulates that rejection of the pacifying action will be considered in the determination of the aggressor and in the application of sanctions.

INTEGRATION OF THE INTER-AMERICAN TREATY OF RECIPROCAL ASSISTANCE WITH THE UNITED NATIONS CHARTER

Care was taken to mesh provisions of the Inter-American Treaty of Reciprocal Assistance with the United Nations Charter. Article 3, paragraph 4 of the Rio Treaty permits measures of self-defense against aggression "until the Security Council of the United Nations has taken the measures necessary to maintain international peace and security." Article 5 obligates the contracting parties to inform immediately the U. N. Security Council of any action undertaken or in contemplation for the purpose of maintaining inter-American peace and security. Moreover, article 10 specifies that none of the provisions of the Rio Treaty shall be construed as impairing obligations of the contracting parties under the United Nations.

THE ORGANIZATION OF AMERICAN STATES (OAS)

A year after the Rio Treaty was drawn up, the American Republics took a further step toward defining the basis of their relations. In 1948 at Bogota the Ninth Inter-American Conference wrote a constitution for the various agencies and institutions that had gradually become a part of the loosely knit inter-American system. The Charter of the Organization of American States, the constitution of the new system, came into legal effect December 13, 1952. Supreme authority rests in the Inter-American Conference which is to meet once every 5 years unless called into special session.

[12] See below, p. 311.

PEACEFUL SETTLEMENT OF DISPUTES

Along with the thorough reorganization of the machinery of the inter-American system at Bogota, the American Republics worked out an agreement on the pacific settlement of disputes.[13] The treaty, known as the Pact of Bogota, was designed to incorporate in a single instrument the wide variety of old agreements between some of the American nations on peaceful settlement.[14]

The gap between the provisions of the Rio Treaty and the unratified Bogota Pact has been partially filled in practice by the Inter-American Peace Committee. The Committee, which has been functioning since 1948, is composed of representatives of five countries whose services are permanently available upon request. Its main purpose is to suggest "the measures and steps which may be conducive" to a peaceful settlement of controversies.[15] The Peace Committee cannot lend its services unless they are acceptable to all parties concerned, nor can it compel compliance with its recommendations.[16]

THE INTER-AMERICAN DEFENSE BOARD

One important agency, the Inter-American Defense Board, was purposely excluded from the Charter of the OAS. The creation of the Board stemmed from a decision of the Meeting of Foreign Ministers during World War II to recommend to the American governments:

> The immediate meeting in Washington of a commission composed of military and naval technicians appointed by each of the governments to study and to recommend to them the measures necessary for the defense of the continent.[17]

The commission, called the Inter-American Defense Board, met in Washington for the first time in March 1942. During the war years, it outlined the broad basis for inter-American military cooperation, including recommendations on the elimination of clandestine telecommunications stations, security against sabotage, antisubmarine defense, and the production of strategic materials. During 1945, the Board transmitted to the governments of the American Republics several resolutions embodying long-range recommendations for the cooperative defense of the hemisphere. Among these were resolutions on hemisphere telecommunications, standardization of materiel, utilization of manpower, and standardization in organization and training of the armed forces for inter-American military cooperation.

The Chapultepec Conference of 1945, which looked forward to a postwar inter-American system, recommended the creation of a permanent agency, formed of the representatives of the military leaders of each of the American republics, "for the purpose of proposing to the said governments measures for a closer military collaboration

[13] For text, see Collection of Documents, p. 654.

[14] At the time of signature seven nations attached reservations. In particular, the provisions for compulsory arbitration of disputes have proved particularly objectionable to a number of states. Turlington, Edgar. The Pact of Bogota. American Journal of International Law, vol. 42, No. 3, July 1948, p. 611. In fact, only nine states have submitted their ratifications to the Pact of Bogota. They are Costa Rica, El Salvador, Haiti, Honduras, Mexico, Nicaragua, Panama, Dominican Republic, and Uruguay.

[15] Pan American Union. Second report of the Inter-American Peace Committee submitted to the 10th Inter-American Conference, Organization of American States, 10th Inter-American Conference, Doc. 11 (English), Feb. 3, 1954, p. 4. The Committee originated with a resolution of the Second Meeting of Consultation of Foreign Ministers in Havana in 1940.

[16] Under the new statute of the Peace Committee, members will be elected for staggered 5-year terms with no reelection. In August 1956 the Council voted the following membership whose terms were established by lot: Mexico, 5 years; United States, 4 years; Brazil, 3 years; Argentina, 2 years; and Cuba, 1 year. Diario las Americas, August 7, 1956, p. 1.

[17] The Inter-American Defense Board. The Inter-American Defense Board: An Introduction to Mutual Security Planning by the American Republics. Washington, n. d., p. 6.

among all the governments and for the defense of the Western Hemisphere."[18] Until such time as a permanent agency was formed, the Inter-American Defense Board was to continue to function.

Later, at Bogota in 1948, an attempt strongly supported by the United States to get the Defense Board or a similar military advisory group incorporated into the Charter of the Organization of American States on a permanent basis met with resistance from the Argentine and other delegations who argued that it would not be in keeping with the pacific traditions of the inter-American system.[19] A compromise was reached. The charter did provide for an Advisory Defense Committee to advise the Organ of Consultation on problems of military cooperation, but it was to be convoked only when the latter dealt with matters relating to defense against aggression.[20] On the other hand, the Conference at Bogota voted to continue the Inter-American Defense Board until such time as a two-thirds majority of the members should decide to abolish it.[21]

D. Effectiveness of the Inter-American System of Collective Security

It has become almost axiomatic that an effective security system must precede disarmament. Nations will be reluctant to abandon their weapons of self-defense unless some alternative method is devised to guarantee their sovereignty and independence.

The Latin American Republics are no exception. Today they are conscious of three possible sources of danger: (1) Inter-regional situations or disputes by members of the American community; (2) the undermining of public institutions by subversive action; and (3) foreign attack. The regional collective security system forged at Rio de Janerio and Bogota is designed to function in all three contingencies. Its effectiveness can be measured only to the extent it meets threats to hemisphere peace.

MAINTAINING INTER-AMERICAN PEACE

Costa Rica and Nicaragua, 1948–49

The ability of the Rio Treaty to preserve peace in the Americas has been put to test on a number of occasions. Just 8 days after the Treaty came into effect, Costa Rica notified the Council of the OAS that it was being invaded by troops based in Nicaragua.[22] The Council immediately convoked the Organ of Consultation and sent an investigating committee to the disturbed region. The committee's report placed blame for the tense situation upon both parties—on Costa Rica for harboring the international revolutionary group—the Caribbean Legion—and on Nicaragua for permitting Costa Rican exiles to organize a revolutionary movement aimed at the overthrow of the Costa Rican Government.[23] It recommended that both Governments refrain from all hostile acts and prevent the use of their

[18] U. S. Department of State. Report of the Delegation of the United States of America to the Inter-American Conference on Problems of War and Peace. Department of State publication 2497, Conference Series 85. Washington, Government Printing Office, 1946, p. 69.
[19] Council on Foreign Relations. The United States in World Affairs, 1948–49. Harper & Bros., New York, 1949, p. 366.
[20] Gantenbein. Op cit. The Charter of the Organization of American States, signed April 30, 1948. Arts. 44 and 46, pp. 862–863.
[21] Inter-American Defense Board. Op cit., p. 10.
[22] Pan American Union. Division of Law and Treaties. Aplicaciones del Tratado Interamericano de Asistencia Reciproca, 1948–55. Washington, 1955, pp. 26–27.
[23] Ibid., p. 28.

territory for military organization by foreign rebels. A military committee was dispatched to the scene to observe the efforts made by Costa Rica and Nicaragua to abide by the recommendations.[24] In less than 2 months a satisfactory settlement was achieved.

Caribbean Imbroglio, 1950

Revolutionary activities in the Caribbean again brought the Rio Treaty into operation in 1950.[25] This time Haiti accused the Dominican Republic of aiding Haitian exiles in a conspiracy to overthrow its Government by armed force. The Dominican Republic countered with charges that similar conspiracies aimed at itself were being countenanced and abetted by the Governments of Guatemala and Cuba as well as Haiti.

The OAS Council followed the procedure utilized in the earlier Costa Rican-Nicaraguan dispute. First, the Council convoked the Organ of Consultation and called a meeting of Foreign Ministers. Then, acting in its capacity as a provisional Organ of Consultation, the Council appointed a five-man investigating committee consisting of the representatives to the OAS of Bolivia, Colombia, Ecuador, the United States, and Uruguay. For more than 3 weeks the committee pursued its investigation, in the process visiting Haiti, the Dominican Republic, Cuba, Guatemala, and Mexico. In every case the presidents and other high officials of the governments involved in the dispute cooperated. The investigating committee submitted a detailed analysis of the situation to the Council, which in turn recommended measures for removal of the causes of the difficulties, and threatened the application of sanctions on any party repeating the hostile acts. When the governments concerned agreed to remove the causes of the disturbances, the Council dissolved the Organ of Consultation.

Costa Rica-Nicaragua, 1955

In January 1955, Costa Rica requested a meeting of the Organ of Consultation on the grounds that a situation existed, created by Nicaragua, which endangered its territorial integrity, sovereignty, and political independence.[26] An investigating committee was sent to the area and observed both from the ground and air the operations of the invading forces. The committee also interrogated both high officials and captured combatants.

From its investigations the committee concluded that Costa Rica had been the victim of intervention, foreign in its preparation, financing, and supply of arms and munitions. The Council of the OAS recommended that the American governments sell combat planes to Costa Rica which was without an air force. Within 24 hours 4 P–51's sold by the United States to the beleaguered Costa Rica appeared on the scene.

Apparently, the quick aid rendered by the United States on the recommendation of the OAS Council, the presence of five Ambassadors, the military observers from other republics, and the presence of Mexican and United States observation planes convinced the leadership of the attacking force that the Organization of American States would brook no violation of inter-American norms. The belligerents were subsequently disarmed and interned in Nicaragua.

[24] All relevant documents in ibid., pp. 71–147.
[25] Ibid., pp. 26–27.
[26] All relevant documents in ibid., pp. 159–205.

The Inter-American Peace Committee

Since its installation in 1948, the services of the Inter-American Peace Committee have proved useful in composing differences among some of the American States of a nature not serious enough to invoke the Rio Treaty.[27]

The case of Haiti and the Dominican Republic in 1949 will serve to illustrate the work of the Peace Committee. Haiti requested a meeting of consultation under the Rio Treaty, charging the Dominican Republic with "moral aggression" for permitting the use of its territory for attacks against the Haitian Government by radio broadcast.[28] After hearing the Dominican Republic's reply to the charges, the Council of the OAS decided that the situation was not grave enough to justify the procedures of the Rio Treaty. Whereupon, the Government of Haiti requested the help of the Inter-American Peace Committee.

With the consent of the Dominican Republic, a delegation of the Peace Committee visited both countries. After a week it succeeded in negotiating a pledge by both parties not to tolerate in their respective territories the activities of anyone seeking to disturb the peace of a neighboring country.

The Peace Committee has not always been so successful. As has been noted, it cannot intervene without the express consent of the parties to a controversy. Nor can it enforce compliance with its suggestions. On one occasion Peru refused to accept its services in a dispute with Colombia.[29] Another time Guatemala delayed in allowing the Peace Committee to concern itself in the anti-Communist revolt in that country in 1954, preferring to carry the case to the United Nations Security Council.[30]

Nevertheless, where there has been willingness to negotiate, intervention by the Peace Committee has facilitated a settlement. Moreover, as one authority has noted, "consent is made easier by the semi-collective character of the intervention." [31]

To date, the successes of the Organization of American States in averting inter-American conflict have been occasioned by disputes between the small nations in the Caribbean and Central America. The inter-American system has not had to prove itself in a test involving the more powerful American Republics.

PREVENTING SUBVERSION

Experience of the Inter-American system with Axis subversive activities

The foreign ministers meeting at Rio de Janeiro 5 weeks after Pearl Harbor was concerned about Axis subversion in the Western Hemisphere. In Latin America Axis subversive strategy was twofold: to cripple Latin American assistance to the Allied cause and to soften the fabric of Latin American institutions to the point where they would be susceptible to Nazi political control without military action. Axis diplomatic missions had become centers in Latin America for directing, coordinating, and financing the program of subversion.

[27] See Second Report of the Inter-American Peace Committee. Op. cit.
[28] All relevant documents in Aplicaciones. Op. cit., pp. 61-68.
[29] Second Report of the Inter-American Peace Committee. Op. cit., pp. 11-12.
[30] Houston, John A. Latin America in the United Nations. United Nations Studies No. 8. New York, Carnegie Endowment for International Peace, 1956, p. 107.
[31] Fenwick, Charles G. Inter-American Regional Procedures for the Settlement of Disputes. International Organization, vol. X, No. 1, February 1956, p. 20.

To meet the insidious threat posed by subversive activities of the Axis Powers, the foreign ministers recommended a comprehensive policy for tightening individual and collective political defenses of the Americas. At the same time, they directed the creation of a committee to study and coordinate the measures recommended to combat Nazi political warfare and sabotage.[32]

Seven governments were chosen to select members of the Committee, known as the Emergency Advisory Committee for Political Defense.[33] The members were directed to act, not as representatives of their respective Governments, but in the name and on behalf of each of the 21 Republics.[34] A majority of votes was sufficient for approval of any proposal before the Committee, and no member could properly base his negative vote solely on the international policy or other special position of the country by which he was designated.[35] The delegation of authority to 7 individuals of the 21-nation community was a novel arrangement in international bodies.[36]

Liaison officers in each Republic served as direct contacts between the Governments and the Committee. The machinery was rounded out by the use of consultative visits, in which members of the Committee called upon national officials in each country to discuss their problems.[37]

In its 3 years' existence, the Emergency Advisory Committee for Political Defense adopted 25 resolutions designed to combat Axis political aggression in the Western Hemisphere.[38] Its work was directed to such varied measures as the control of dangerous aliens, the protection of ships and harbor installations, the curtailment of supplies to Axis submarines off the coasts of America, and the control of transit across national boundaries. The Emergency Advisory Committee for Political Defense helped the American Republics, individually and collectively, to limit Axis sabotage and propaganda in the Hemisphere.[39]

During the reorganization of the inter-American system that followed the Bogota Conference of 1948, the activities of the wartime Emergency Committee [40] were terminated.

The Guatemalan case

Since World War II the problem of subversion in the Western Hemisphere has been associated with the activities of international communism. In 1950, Communist influence began to increase in Guatemala and reached the point where key posts in the Government were held by Moscow-trained Communists. Not only were the Communists exerting substantial political control over the Guatemalan

[32] Resolution XVII and attachment. In Gantenbein. Op. cit., pp. 809-814.
[33] Argentina, Brazil, Chile, Mexico, United States, Uruguay, and Venezuela.
[34] Emergency Advisory Committee for Political Defense. Annual report, July 1943. Montevideo, 1943 pp. 10-11.
[35] Ibid., p. 14.
[36] For a full discussion of the representative nature of the committee see Carl B. Spaeth and William Sanders. The Emergency Advisory Committee for Political Defense. American Journal of International Law, vol. 38, No. 2, April 1944, pp. 218-241.
[37] Emergency Advisory Committee for Political Defense. Second annual report, July 15, 1943-October 14, 1944. Montevideo, 1944, pp. 40-41.
[38] Comite Consultivo de Emergencia para la Defensa Politica. Legislacion para la defensa politica en las Republicas Americanas. Tomo I, Montevideo, 1947, p. 2.
[39] Argentina, which remained neutral for the major part of the war, did not cooperate fully with the committee. Emergency Advisory Committee for Political Defense. Second annual report. Op. cit., p. 7.
[40] Organization of American States. Committee on Inter-American Organizations. Report of the Committee on Inter-American Organizations relating to the Emergency Advisory Committee for Political Defense. Approved by the Council of the Organization of American States at the meeting of November 3, 1948 (*its* Document C-i-4/48-E).

people but it was reported that they were also importing armaments from behind the Iron Curtain.[41]

The threat of Communist penetration caused the United States, at the 10th Inter-American Conference held in Caracas in March 1954, to press for a clear-cut definition of inter-American policy regarding the intervention of international communism in the Western Hemisphere. The result was a resolution which declared:

> The domination or control of the political institutions of any American state by the international Communist movement * * * would constitute a threat to the sovereignty and political independence of the American States, endangering the peace of America, and would call for a meeting of consultation to consider the adoption of appropriate action in accordance with existing treaties.[42]

On June 19, 1954, the Communist-influenced Government of Guatemala charged that Honduras and Nicaragua were committing aggression against it by allowing rebels to use their territory as a base for invasion in an attempt to force the government out.[43] Before any of the inter-American peace machinery was effectively utilized, however, the rebels were victorious and the conflict ended.

The case of Communist penetration into Guatemala raised a number of problems which were not ended with the victory of the Guatemalan exiles. One important problem was that of regional versus universal jurisdiction. The United States believed that the problem should be dealt with in the first instance by the Organization of American States.[44] Guatemala felt that the matter should be handled by the United Nations Security Council. When the case came before the Security Council a resolution supported by the United States, on referring the matter to the OAS, was vetoed by the Soviet Union; a second resolution introduced by France, calling for a cease-fire, was passed; and a third resolution, introduced by the Soviet Union, to handle the case in the Security Council, was defeated 4 to 5 with 2 abstentions.[45] The votes of the non-Communist members of the Security Council on the latter resolution indicated a divergence of opinion as to how the case should be handled.

A second problem raised in the Guatemalan case is the ability of the inter-American peace machinery to operate when one of the parties to the dispute refuses its cooperation. The Guatemalan Government, although it had at first appealed to the Inter-American Peace Committee, later asked that the committee defer action on its case.[46] Guatemala finally accepted the services of the Peace Committee, but this was too late to permit an investigation before its Government fell. In previous cases of conflict the Peace Committee has been successful when the parties to the dispute immediately accepted its services. In the Guatemalan affair only Honduras and Nicaragua immediately accepted the services of the Peace Committee. The Council of the OAS could have considered the problem at any time under provisions of the Rio Treaty, regardless of the position taken by the Government of Guatemala. During the period of the conflict, however, no meeting of the Council was held.

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[41] Communist Influence in Guatemala. News conference. Statements by Secretary Dulles, Department of State Bulletin, June 7, 1954, p. 874; Collection of Documents, p. 663.

[42] Department of State. 10th Inter-American Conference, Caracas, Venezuela, March 1–28, 1954. Report of the delegation of the United States of America, with related documents, p. 157.

[43] New York Times, June 20, 1954, p. 2.

[44] New York Times, June 21, 1954, p. 3.

[45] New York Times, June 26, 1954, p. 1. The four votes for were: Soviet Union, Lebanon, Denmark, and New Zealand. The five votes against were the United States, Turkey, the Republic of China, Mexico, and Brazil. Great Britain and France abstained.

[46] Inter-American Peace Committee Report on the controversies between Guatemala, Honduras, and Nicaragua. Washington, Pan American Union, July 8, 1954, p. 21.

The use of foreign territory as a base for arming rebel and exile groups is another problem of the inter-American security system brought to the fore by the Guatemalan episode. In this case Guatemala charged Honduras and Nicaragua with allowing rebels to arm on their territory. Since no investigation of the incident occurred, it was not possible to substantiate the charge. This question, however, has been an aspect of other Latin American disputes, and when an investigation has shown clearly that rebels were arming on foreign soil the OAS has condemned the practice.[47]

A fourth and very important problem is the adequacy of the inter-American system to deal effectively with Communist subversion. The United States and other American States did succeed in calling for a meeting of the inter-American foreign ministers to consider the threat the Guatemalan situation posed for the hemisphere. Before the meeting could be convened, however, the anti-Communist forces won control of the Government. Consequently, the proposed meeting was postponed indefinitely.[48] The Communist-influenced Government of Guatemala fell, not through action by the inter-American security system, but by armed revolution.

HEMISPHERIC DEFENSE

The third aspect of the inter-American security system, that of defense against foreign attack, has not yet had to meet trial. The need for coordinated hemispheric defense was demonstrated in World War II, which taught a severe lesson in the costliness of uncoordinated hemisphere efforts. Difficulties arose as a result of lack of common equipment and training. From 1919 to 1941, 12 of the Latin American countries employed European military missions to supply armaments and military equipment.[49] Ships and armaments, largely built by European powers, became in many cases obsolete and incapable of sustaining the operations of modern warfare. Moreover, operations involving Latin American troops or equipment were curtailed by lack of spare parts and ammunition previously supplied by Europe. In consequence, the United States was required to furnish equipment to its Latin American allies at a time when its own supplies were critically short.

At the end of the war, the Inter-American Defense Board pondered the methods best suited to give hemisphere solidarity meaning in military terms. In October 1945, the Board forwarded to the governments of the American Republics its recommendations, among which were proposals to standardize the organization and training of the armed forces of the hemisphere and to standardize materiel.[50]

In May 1946, before the United States began to supply military aid to other parts of the world, the executive branch requested Congress to pass a bill on inter-American military cooperation. The bill would have provided for the instruction and training of Latin American military and naval personnel, for the maintenance and repair of their military equipment, and for the transfer of United States armaments. However, such military assistance apparently did not seem urgent

[47] See p. 311 and p. 331.
[48] New York Times, July 3, 1954, p. 4.
[49] U. S. House of Representatives, 80th Cong., 1st sess. Committee on Foreign Affairs. Rept. No. 996. Contributing to the Effective Maintenance of International Peace and Security. July 18, 1947, p. 8.
[50] Britannica Yearbook, 1946, p. 395.

at the time. The Foreign Affairs Committee of the House twice reported the bill favorably but no further action was taken on it by Congress.[51]

MUTUAL DEFENSE ASSISTANCE IN THE WESTERN HEMISPHERE

As Soviet aggressive intentions became more clear, the United States began a program of military assistance to free nations with the Mutual Defense Assistance Act of 1949. The American Republics, however, were not included in the military assistance program until after the Communist aggression in Korea in 1950. In December 1950, the United States Government requested the convocation of a Meeting of Foreign Ministers—

> to consult its fellow members of the Organization of American States with respect to the world situation which we all face and on the coordination of the common effort required to meet it.[52]

The meeting of Foreign Ministers took place in Washington in March and April 1951. The final act of the meeting condemned the aggression in Korea, reaffirmed the solidarity of the American Republics, and recommended that each take steps to contribute whatever possible to the defense of the continent and to the collective security efforts of the United Nations. A resolution of inter-American military cooperation recommended that the American Republics:

> orient their military preparation in such a way that through self-help and mutual aid [they can] (*a*) increase those of their resources and strengthen those of their armed forces best adapted to the collective defense, and maintain those armed forces in such status that they can be promptly available for the defense of the continent; and (*b*) cooperate with each other, in military matters, in order to develop the collective strength of the continent necessary to combat aggression against any of them.[53]

The Inter-American Defense Board was directed to prepare plans for the common defense.

The planning which the Board has done provides for broad areas of joint action rather than specifying each nation's precise commitments.[54] One of its principal advantages is that it keeps hemisphere defenses in a posture of readiness for cooperation and obviates the creation of a similar, but less experienced body, in the event of a future crisis.

However, although the Inter-American Defense Board continues to plan for defense on a hemisphere-wide basis, neither its functions nor the provisions of the Rio Treaty for mutual defense against foreign attack have been buttressed by such positive provisions for joint operations as have been made by the North Atlantic Treaty Organization.

Military aid from the United States to the American Republics was authorized in the Mutual Security Act of 1951. Thereupon negotiations were carried on with eight countries. Some of the Governments approached, principally Brazil, Chile, Mexico, and Uruguay, objected to certain provisions in the bilateral agreements such as those obligating recipients to make their strategic resources available to the United States and to limit trade with the Communist bloc.[55] However,

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[51] U. S. House of Representatives. 80th Cong., Rept. No. 996. Op. cit., p. 3.
[52] U. S. Department of State. Fourth Meeting of Consultation of Ministers of Foreign Affairs of American States. Washington, D. C., March 26, April 17, 1951. Report of the Secretary of State. Government Printing Office, May 1953, p. 2.
[53] Ibid., p. 69.
[54] Christian Science Monitor, April 7, 1956, p. 7.
[55] Council on Foreign Relations. The United States in World Affairs, 1952. Harper & Bros., New York, p. 265.

after some delay they did approve the agreements with the exception of Mexico which called off negotiations.[56] To date the following 12 Latin American Republics have approved defense assistance agreements with the United States: Brazil, Chile, Colombia, Cuba, the Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Nicaragua, Peru, and Uruguay.[57]

E. Latin America Role in Free World Defense

ARMED FORCES OF LATIN AMERICA

As a region, Latin America is comparatively weak in armed forces. During the Second World War it was necessary to divert some 100,000 men from the United States to insure the security of Latin America.[58] Only the two most populous Republics, Brazil and Mexico, contributed military forces which saw action in the European or Asian theaters of war. Since that time, in response to the threat of Communist aggression, many of the Latin American Republics, aided by military assistance advisory groups from the United States, have undertaken to build up and improve their forces. It is now believed that in the event of a future world conflict it would not be necessary for the United States to divert such a large number of troops.[59]

Military forces in the Latin American States range from a minimum of a civil guard police force in some of the smaller countries to a complete three-service complement of army, navy, and air force in some of the larger countries. While official figures on the size of the armed forces are not available, the estimates in the following table, taken from published sources, present a general picture of the Latin American forces.

Armed forces of Latin America

Unless otherwise noted, from Aviation Studies (International), Ltd. Air Force and Naval Air Statistical Record. London. As amended to Apr. 10, 1956]

Country	Population [1]	Year	Army	Navy	Air force
	Millions				
Argentina	19.1	1954	107,000	21,500	19,000
Bolivia	3.2	1955	15,000	None	2,000
Brazil	58.5	1955	90,000	8,000	9,200
Chile	6.6	1955	20,500	8,000	13,000
Colombia	12.7	1955	10,000	1,500	200
Costa Rica [2]	1.0				
Cuba	5.8	1955	19,000	2,000	2,400
Dominican Republic	2.4	1955	3,500	[3] 3,000	2,000
Ecuador	3.6	1955			3,100
Guatemala	3.1	1955	21,000	None	400
Haiti	3.2	1955	4,553	None	400
Honduras	1.6	1955	2,500	None	1,200
Mexico	28.8	1955	41,800	2,500	3,500
Nicaragua	1.2	1955	10,000	None	1,300
Panama [4]	.9	1955	None	None	None
Paraguay	1.6	1955	5,800	400	
Peru	9.4	1955	10,000	2,500	5,000
El Salvador	2.1	1955	6,000	400	500
Uruguay	2.5	1955	3,000	1,450	2,000
Venezuela	5.8	1955	10,000	2,240	5,000

[1] National Planning Association. Technical Cooperation in Latin America; Recommendations for the Future; National Planning Association, Washington, D. C., June 1956.
[2] Costa Rican Army abolished in 1948 and replaced by civil guard of 1,200. (Steinberg, S. H., editor, The Statesman's Yearbook, 1955, New York, London, St. Martin's Press, 1955.)
[3] Jane's Fighting Ships, 1955–56; London, 1956.
[4] Defense of Panama Canal handled by United States. Panama has national police force.

[56] Ibid.
[57] U. S. House of Representatives. Committee on Foreign Affairs. Hearings on Mutual Security Act of 1956, p. 292.
[58] U. S. Senate. Committee on Foreign Relations. Hearings on Mutual Security Act of 1956. Statement of E. Perkins McGuire, p. 313.
[59] Ibid.

Although the military forces of Latin American countries at their present strengths are considered adequate for the maintenance of their internal security, none is capable of individually resisting invasion by a major power. As in the case of other small countries throughout the world, defense against such aggression would require collective measures, either on a regional basis, through the Rio Treaty, or through the United Nations.

ARMAMENTS

As one of the underdeveloped regions of the world, Latin America at the present time does not have the industrial capacity to equip large forces with modern weapons. It is primarily dependent on foreign sources to attain arms.

Much of the arms at the present time are being supplied by the United States, some under the mutual-security program. The Department of Commerce estimates the total amount in deliveries of military supplies to Latin America since the initiation of the program to December 31, 1956, at $294 million.[60] Nineteen Latin American countries have either received United States grants or have purchased military equipment under the reimbursable aid provisions of the Mutual Security Act.[61]

OTHER FOREIGN SOURCES OF ARMAMENTS

The Latin American Republics have not depended exclusively upon the United States for their armaments. In the present global strategic plans of the United States, Latin America has been assigned a low military priority because it is considered to be relatively secure from direct attack.[62] The amount of military assistance provided by the United States under the mutual assistance program is less than 1.5 percent of the total United States military assistance throughout the world. Some Latin American governments have not been satisfied with United States efforts to meet what they believe to be their armament requirements. Consequently, they are purchasing military equipment from sources other than the United States, because prices and terms are usually more favorable.

Information regarding Latin American military purchases from Europe and Asia is fragmentary. It has been reported that since the initiation of the mutual-defense program 8 Latin American Republics have purchased a total of 74 naval ships from Europe and Asian countries.[63] Venezuela presently has on order 3 heavy destroyers in England, a transport in France, and 6 light destroyers in Italy, the fifth of which was delivered in July 1956.[64]

In December 1956, the Brazilian Government purchased a light aircraft carrier from the British Government at a reported price of

[60] Net grants as reported in: U. S. Department of Commerce. Foreign Grants and Credits by the United States Government. December 1956 quarter, p. S-9. Of this total $174 million was for materials on a grant basis obtained from appropriations or from excess stocks.

[61] U. S. House of Representatives. Committee on Armed Services. Report of the Honorable Porter Hardy on Military Assistance Advisory Groups, Military, Naval, and Air Force Missions in Latin America. Washington, U. S. Government Printing Office, 1956, p. 3, and Department of State.

[62] U. S. Senate. Committee on Foreign Relations. Hearings on Mutual Security Act of 1956. Statement of E. Perkins McGuire, p. 313.

[63] U. S. House of Representatives. Committee on Armed Services. Report of the Honorable Porter Hardy on Military Assistance Advisory Groups * * * in Latin America. Op. cit., p. 3.

[64] Diario las Americas, July 17, 1956, p. 1.

$22 million.[65] Earlier the same year, Brazil obtained a Dutch floating drydock. In the meantime, the armed forces in Argentina put pressure on the provisional government of General Aramburu to modernize Argentina's armed services. Navy Minister Adm. Teodoro Hartung announced near the end of the year that the navy was negotiating with both Great Britain and the United States for the purchase of an aircraft carrier "to offset the carrier bought in December from England by Brazil." [66] In June the keel was laid in a British shipyard for the first of two destroyers on order there for the Chilean Navy.[67]

As to aircraft, it is reported that among the receipts of military aircraft from Europe, three South American countries have purchased 114 jet aircraft from the United Kingdom.[68] Argentina is reported to have bought 20 heavy bombers and 200 basic trainers from England and 100 fighter bombers from Italy.[69] Recently it announced its intention to buy 106 military aircraft for which offers are being considered from the United States, Canada, France, Great Britain, the Soviet Union, Sweden, and Italy.[70] Nicaragua received 25 F–51 Mustangs from Swedish surplus.[71] It is also understood that one country is purchasing arms and equipment from the Hertzall factory in Belgium.[72] Guatemala, as indicated earlier, turned to the Soviet bloc for weapons when the Government was under Communist influence.

DOMESTIC PRODUCTION OF ARMAMENTS

Some of the Western Hemisphere Republics have demonstrated an interest in relieving their dependency upon foreign sources for war material. Brazil, for example, is encouraging the manufacture of aircraft. In 1954, Fokker, Industria Aeronautica, S. A., a joint Brazilian-Dutch enterprise, began production of aircraft. By 1955, Fokker turned over to the Brazilian Government the first plane manufactured in Brazil, made by Brazilians, from about two-thirds Brazilian material.[73] At the time 95 more planes were in phases of production in the infant industry.[74]

Argentina has a longer history of aircraft production. Industrias Aeronauticas y Mecanicas del Estado (IAME), organized around 1927, is a state organization employing 13,000 workers.[75] In 1930 IAME began intensive research to develop its own designs, and some 300 observation planes, bombers, training and transport planes were turned out.[76] Later the Argentine factory acquired patent rights for Curtiss Hawk 75 and Fokke-Wulf 44–J Stieglitz, of which 200 and 500 were produced in Cordoba.[77] In 1947 IAME produced the first Latin-American jet-propelled plane. The present Government has indicated its intention of increasing local production with a view to modernizing Argentina's air force.

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[65] Hilton, Ronald (Director) Hispanic American Report. Report for December 1956. Stanford University, vol. IX, No. 12, p. 609.
[66] Ibid., p. 599.
[67] Diario las Americas, June 22, 1956, p. 1.
[68] Hardy report. Op. cit., p. 8
[69] Argentina Fosters Ambitious Air Plans. Aviation Week, May 16, 1955, p. 46.
[70] Diario las Americas, July 7, 1956, p. 1.
[71] Bureau of Aviation Statistics. Airforce and Naval Air Statistical Record (as amended to April 10, 1956). Aviation Studies (International), Ltd., London.
[72] Hardy Report. Op. cit.
[73] Instituto de Engenharia Militar (Brazil). Revista de Engenharia Militar, ano XVIII, Jan./Fev. 1956, No. 205, pp. 7–10.
[74] Ibid.
[75] Aviation Week. Op. cit., p. 49.
[76] Ibid.
[77] Ibid.

BASES

The geographic position of Latin America renders it particularly important as a location for bases to be used in the defense of the Western Hemisphere in time of war.

The granting of airbase rights in strategic spots by a number of Latin American countries during World War II was of major importance to Allied operations. There were large installations in Cuba, Brazil, Panama, Ecuador, and Peru, and the air route through the West Indies and Natal to Dakar was one of the most important supply routes to the African, European, and China-Burma theaters.

At the present time there are only two bases flying the United States flag in the Latin American countries. These are the military installations in the Panama Canal Zone and the naval base at Guantanamo, Cuba.[78] Both of these are used by United States forces under treaties of long standing with the respective countries in which they are located. In case of war, however, the United States would probably be granted access to other bases in Latin America, as was the case in World War II.

In addition, the United States maintains stations in Latin America for the tracking and testing of missiles. By an agreement signed in 1951, the United States and the Dominican Republic agreed to collaborate in the maintenance of a long-range proving ground for the testing of guided missiles.[79]

On January 21, 1957, the United States concluded an agreement for the establishment of a guided-missile tracking station on Fernando de Noronha Island, about 200 miles off the coast of Brazil.[80] The site is considered an essential link in the 5,000-mile, guided-missile track between Florida launching sites and the terminal control point, British-ruled Ascension Island. It will remain under Brazilian command and flag. At the end of the agreement, all permanent installations will remain on the island. The agreement was made under provision of the Rio Treaty and the 1952 bilateral pact on military assistance.[81]

RAW MATERIALS

Latin America is rich in raw materials and has many natural resources vital in defense. Among these are oil, iron, tin, antimony, asbestos, bauxite, beryl, cadmium, columbite, copper, cordage fibers, fluorspar, manganese, mercury, molybdenum, quartz, rare earths, tin, uranium, and vanadium. Approximately 30 items in the United States stockpile of strategic materials come from Latin America. In time of war the raw materials of Latin America become more vital to the United States.

LATIN AMERICA AND WORLD COLLECTIVE SECURITY

Besides their commitments for regional collective security, the Latin American Republics have assumed global collective-security obligations under the United Nations Charter. The Communist invasion of Korea in 1950 raised the question of Latin American

[78] Information from Department of Defense.
[79] U. S. Department of State. Treaties and Other International Acts, 2425.
[80] New York Times, Feb. 10, 1957, p. 1.
[81] For text of agreement, see Current History, April 1957, p. 239.

participation in collective action against aggression occurring outside the Western Hemisphere.

On June 27, 1950, 3 days after the North Korean Communists crossed the 38th parallel, the Security Council adopted a resolution which recommended that the members of the United Nations "furnish such assistance to the Republic of Korea as may be necessary to repel the armed attack and to restore peace and security in the area." [82]

The two Latin American members of the Security Council supported the resolution. The following day the Council of the Organization of American States voted to support the Security Council's resolution. The OAS Council, although under no obligation to go on record in the matter, unanimously declared "its firm adherence to the decisions of the competent organs of the United Nations," and affirmed "the pledges of continental solidarity which unite the American States." The preamble of the resolution stressed that all of the members of the Organization of American States were members of the United Nations and therefore bound to comply with its decisions.[83]

Following the Security Council's June 27 resolution, the Secretary General cabled all the United Nations governments to inquire what assistance each would be able to provide "including combat forces, particularly ground forces." [84] Requests were also made by the Security Council and the Economic and Social Council for food, clothes, medical supplies, and other items for civilian relief in Korea.

Seventeen of the twenty Latin American Republics responded promptly with varying offers of assistance.[85] Proffers of military assistance were few. Costa Rica and El Salvador offered to send volunteers to the United States for preliminary training for service in Korea. Bolivia placed 30 officers of its regular army at the disposal of the United Nations. Both Panama and Costa Rica offered bases, and Panama offered a corps of volunteers as well as the use of its merchant marine for the transfer of food and supplies. Acceptance of all these offers was deferred. Later, after the Chinese Communists had entered the conflict and attrition on U. N. manpower became severe, Colombia offered to provide an infantry battalion of 1,080 men and a frigate, both of which were accepted by the United Nations Command and saw action. Other Latin American States offered economic assistance.[86]

THE "UNITING FOR PEACE" RESOLUTION

In the session of the General Assembly meeting in the fall of 1950, the United States introduced a plan (known as the Uniting for Peace resolution) to circumvent if necessary the veto in the Security Council.

Several provisions of the resolution as adopted on November 3, 1950, were particularly significant from the point of view of the participation of smaller nations in the collective maintenance of peace. The General Assembly was empowered to assume responsibility in the event of a breach of the peace should the Security Council be

[82] United Nations. Korea and the United Nations. United Nations publications, 1950, 1–8, p. 12
[83] Pan American Union. Annals of the Organization of American States, vol. II, No. 3, 1950, p. 222.
[84] Korea and the United Nations. Op- cit., p. 89.
[85] Complete list of offers by member states of assistance for Korea as of September 15, 1950, in Korea and the United Nations. Op. cit., pp. 89–93.
[86] Uruguay offered $2 million for civilian relief. Venezuela offered medical supplies valued at $100,000 for civilian purposes. The Unified Command Emergency Relief Program for Korea received delivery of a variety of contributions from Latin American Republics.

prevented from acting, and to recommend appropriate collective measures, including the use of armed force when necessary.[87] The resolution further recommended that each member—

> maintain within its armed forces elements so trained, organized, and equipped that they could promptly be made available in accordance with its constitutional processes for service as a United Nations unit or units, upon recommendation of the Security Council or General Assembly.[88]

Only Argentina among the Latin American Republics withheld its support from the draft resolution. The Argentine delegate was not convinced that the earmarking of national contingents for United Nations use had been proved to be an extension of the General Assembly's power.[89]

The significance of the resolution for the smaller nations was summarized by the Uruguayan delegate. He said:

> While this draft resolution calls upon the small states to play an active part in maintaining peace and security, it also imposes upon them grave and weighty responsibilities already laid down in the charter. In voting for this draft resolution, every one of us will shoulder a serious obligation, a heavy responsibility. Every one of us must return to his country conscious of his duty to do his utmost for the adoption of the legal, economic and military measures required to place our countries in a legal and material position to discharge, whenever necessary, the responsibility which we are assuming in this historic hour.[90]

As matters developed, the exhortation of the Uruguayan delegate went almost unheeded by his fellow Latin Americans. On April 16, 1951, the United Nations Collective Measures Committee [91] circulated a letter to member governments inquiring about the elements within their national armed forces which would be available for service as a U. N. unit or units in accordance with the Uniting for Peace resolution. Five months later, and almost a year after the adoption of the Uniting for Peace resolution, the report of the Committee indicated that only 11 Latin American governments had replied. The following table summarizes the Latin American replies:[92]

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[87] Collection of Documents p. 166.

[88] Ibid., p. 167.

[89] United Nations General Assembly Official Records, fifth session. 301st Plenary Meeting, November 2, 1950. A/PV. 301, pp. 335-336. Costa Rica ran into a constitutional problem, since the Costa Rican Constitution specifically forbids "a permanent army." (Ibid., 302d Plenary Meeting, November 3, 1950. A/PV. 302, p. 344.) But the clause, "in accordance with their respective constitutional processes," amended to the original draft, paved the way for Costa Rican approval.

[90] Ibid., 299th Plenary Meeting, November 1, 1950. A/PV. 299. p. 293.

[91] Fourteen member committee established by the Uniting for Peace resolution to study and recommend methods, including military, for maintaining peace.

[92] Based on data published in United Nations General Assembly Official Records, sixth session, 1951. Supplement No. 13 (A/1891). Report of the Collective Measures Committee, pp. 37–42.

Country	Troops already serving United Nations (1)	Future earmarking of contingents (2)	Special circumstances influencing earmarking of troops (3)	Remarks (4)
Bolivia		Simple acknowledgment.		
Brazil		Will do utmost to maintain elements within national armed forces for service with the United Nations.		Chief of Brazilian General Staff will shortly arrive in New York to discuss part to be played by Brazilian armed forces under uniting for peace resolution.
Chile		Government of Chile wishes to fulfill the recommendation and is undertaking studies of the problem.	Lack of raw materials and financial and economic situation are important factors affecting Chile's possible contribution.	Chilean permanent delegate authorized to hold consultations on these matters.
Colombia	Frigate *Almirante Padilla* and 1 battalion in Korea.	Will train new battalions for service with U. N. in future.		Commitment in (2) dependent on U. N. or unified command facilitating training and making armaments available.
Ecuador		Will devote special attention as far as possible to development and maintenance of elements trained, organized, and equipped to be available both for the defense of the continent and for service under uniting for peace resolution.	Scanty resources necessarily limit contribution and Ecuador will require assistance of better equipped countries in technical instruction and provision of war supplies.	
Guatemala				Economic capabilities and limited resources do not permit maintenance of elements of its armed forces for service with U. N.
Haiti			Weak economy does not allow rapid increase in military forces.	Troops now being trained on United States pattern and future expansion of forces may allow for participation in action under uniting for peace resolution.
Honduras		Possible organization and training of infantry battalion in conformity with U. S. Army standards now being studied.	Battalion in (2) for service within Honduras only.	Will cooperate for defense of continent.
Mexico		Simple acknowledgment.		
Uruguay		2 destroyer-escorts, combat team on basis of an infantry regiment (in planning stage).		
Venezuela			Large area, geographical situation and strategic resources of country require from military authorities special attention to self-defense, and energies are being concentrated to this end.	National armed forces need both technical training and modern equipment if they are to be effective in support of U. N. action.

Measured against the overall effort of United Nations members, Latin American assistance appears small.[93] However, if compared with the aid from other countries of comparable size and development, especially in the Near East and Asia, Latin American support for United Nations enforcement action was comparatively generous.

UNITED NATIONS EMERGENCY FORCE

The invasion of Egypt by Israel, Britain, and France in the fall of 1956 led to a second call for national units to serve the international organization. Twenty-four members of the United Nations responded to the Secretary General's call for troops to serve in the United Nations Emergency Force. Among these were five Latin American countries. Brazil offered 500 troops; Colombia offered 1 infantry battalion and 2 companies, a total of 550 men; Ecuador offered up to 500 troops; Peru offered up to 500 men; and Chile offered the services of an unspecified number. Colombian and Brazilian troops are serving with UNEF in Egypt.

F. Latin America and Disarmament

EARLY DISARMAMENT EFFORTS IN LATIN AMERICA

During the long quest for a system of security in Latin America disarmament was rarely considered. In the postrevolutionary period the new nations of Latin America felt obliged to maintain military establishments adequate to defend their newly acquired independence. Moreover, Spain's departure from the American continent signaled a long turbulent interval in which rival claims and ambitions were frequently supported by the sword.

Nevertheless, at the same time there existed a strong sentiment against war. The frequent conflicts in the Old World were universally deplored among the new nations, and the belief had taken root that the New World must and could rid itself of the cycle of war that infected Europe. Thus, in spite of some bloody conflicts that marred the peaceful vision Americans had of themselves, the record of amicable settlement of disputes does show a tendency toward peaceful settlement. Leo S. Rowe, former Director General of the Pan American Union, has pointed out:

> * * * since the early part of the 19th century, no fewer than 78 boundary and territorial disputes have been ended by the orderly processes of mediation, conciliation, and arbitration.[94]

DEMILITARIZED FRONTIERS

In line with the desire to prevent war, several attempts were made by Latin American nations to lessen tensions by demilitarizing border zones. Peru and Colombia in 1829 agreed to reduce the military forces in the northern departments of Peru and in the southern ones of Colombia to garrisons and troops absolutely nesessary for maintaining

[93] Listing of the deliveries to the Unified Command Emergency Relief Program for Korea as of December 31, 1954, in: U. S. Department of State. United States participation in the United Nations; report by the President to the Congress for the year 1954. Department of State Publication 5769. Government Printing Office, August 1955, pp. 211–216.

[94] The Problem of Inter-American Organization. Stanford University Press, 1944, p. 48. (Quoted by M. Margaret Ball.)

the country in tranquillity.[95] In 1881 Chile and Argentina signed an agreement by which the Strait of Magellan, the major water passage between the Atlantic and Pacific Oceans prior to the Panama Canal, would be neutralized forever and fortifications or military defenses would be forbidden.[96]

A protocol between Chile and Peru in 1929, which settled the long-festering Tacna and Arica dispute, contained a clause calling for the dismantling of fortifications on the Morro de Arica (Hill of Arica).[97] The hill is still without fortification.

The same year Haiti and the Dominican Republic, which share the island of Hispaniola, signed a treaty of peace, friendship, and arbitration in which it was stipulated that no fortification or other military works could be erected within a limit of 10 kilometers from the frontier line.[98]

OTHER DISARMAMENT AGREEMENTS

Two agreements to limit armaments other than on frontiers have been undertaken in Latin America. The first, a bilateral pact between Argentina and Chile signed in 1902, limited naval armaments.[99] The two countries pledged not to acquire the vessels of war then in the course of construction or to increase their naval armaments during the next 5 years without giving the other 18 months' notice. However, when neighboring Brazil initiated an ambitious naval construction program 2 years later, Chile and Argentina canceled their pact.[100]

More far-reaching was the treaty signed in 1923 by the Central American States—Guatemala, El Salvador, Honduras, Nicaragua, and Costa Rica.[101] The contracting parties limited themselves to the possession of no more than 10 military aircraft each. None was permitted at any time to acquire war vessels, except coast-guard boats. After taking into consideration their relative population, area, extent of frontiers, and other factors of military importance, they fixed for a 5-year period the following limitation on the number of troops each country could maintain in its army and national guard:

Guatemala	5,200
El Salvador	4,200
Honduras	2,500
Nicaragua	2,500
Costa Rica	2,000

The treaty made no provision for inspection or enforcement. On March 26, 1953, Honduras formally denounced the limitation of armaments provisions along with other terms of the 1923 treaty on the grounds that circumstances had altered measurably since the treaty became effective.[102] But long before Honduras withdrew from

[95] Marshall-Cornwall, Maj. Gen. J. J. Geographic Disarmament, Study of Regional Demilitarization. London, Oxford University Press, 1935, pp. 83-84.

[96] Ibid, p. 64. In 1942, the United States tried to get permission to establish air and naval bases in the Strait of Magellan, but was unsuccessful. Whitaker, Arthur P. Argentine Upheaval. New York, Praeger, 1956, p. 102.

[97] Geographic Disarmament. Op. cit., p. 124.

[98] Ibid.

[99] Pan American Union. Inter-American Conference for the Maintenance of Peace to Assemble at Buenos Aires, Argentina, December 1, 1936. Special Handbook for the Use of Delegates. Washington, 1936, p. 44.

[100] Whitaker, Arthur P. The United States and Argentina. Harvard University Press, 1954. p. 98.

[101] Collection of Documents. p. 28.

[102] Republica de Honduras. Memoria de Relaciones Exteriores, 1952-53. Talleres Tipograficos Nacionales, Tegucigalpa, 1954, pp. 183-184

the agreement formally, the convention on the limitation of armaments seems to have been generally ignored.[103]

GENERAL ATTEMPTS TO CONTROL ARMAMENTS WITHIN LATIN AMERICA

In 1923, at the Fifth Pan American Conference, held in Santiago, Chile, the American Republics included for the first time the following topic on their Conference agenda: Consideration of the Reduction and Limitation of Military and Naval Expenditures on Some Just and Practicable Basis.[104]

The delegates who worked on the committee for limitation of armaments were in complete accord as to the desirability of reducing armament expenditures. But a sharp divergence of opinion occurred over the criteria by which the objective might be achieved.[105] Brazil, especially, held that considering the vast differences in population, area, extension of frontiers, and so forth, a single standard for land forces would be impractical. The Honduras delegation proposed, in view of the difficulties attending the limitation of land armaments, that the conference limit itself to consideration of the question of naval armaments. Although both Argentina and Chile came forward with concrete proposals fixing maximum tonnage for war vessels, no agreement among the States represented could be reached. Under the circumstances, the best the committee could produce was a resolution condemning "armed peace which increases military and naval forces beyond the requirements of internal security and the sovereignty and independence of the States." [106]

In the midthirties, the American Republics again discussed the possibility of limiting armaments. But aggression in Europe and Asia dissuaded the countries of the Western Hemisphere from reducing what armed strength they had built up. The Inter-American Conference for the Maintenance of Peace, held in 1936, recommended that the governments conclude general or bilateral agreements to limit their armaments but no specific arms-control arrangements were negotiated.

LATIN AMERICA'S STAKE IN WORLD DISARMAMENT

Although the existence of world tension and the uncertainties about continued peace have caused Latin American countries to strengthen their defenses, other considerations lend weight to the desire by these countries to see armaments reduced and controlled. The frequently reiterated belief that the next war would be global has aroused apprehension about the possible involvement of Latin American countries if it should take place and, therefore, increases their interest in an effective international disarmament agreement. Furthermore, the procurement of armaments has often meant the diversion of scarce foreign exchange from the purchase of equipment vitally needed for economic development. And finally, many people within the hemisphere are aware that the existence of world tension can be used as the

[103] Herrarte, Alberto. La Union de Centroamerica, Tragedia y Esperanza. Editorial del Ministerio de Educacion Publica, Guatemala, 1955, p. 275.
[104] Pan American Union. Fifth International Conference of American States, Special Handbook for the Use of the Delegates. Washington, 1922, p. 30.
[105] Verbatim record of the plenary sessions of the Fifth International Conference of American States, Journal of Sessions. Report of the Committee on Limitation of Armaments on Topic XII, vol. 1, Santiago de Chile, Imprenta Universitaria, 1923, pp. 661–695.
[106] United States Delegation to the International American Conference. Report of the Delegates of the United States of America to the Fifth International Conference of American States, with appendixes. Washington, U. S. Government Printing Office, 1924, p. 195.

rationale to maintain large police and military forces which could be employed for purposes other than defense.[107]

POLITICAL PROBLEMS RELATED TO DISARMAMENT

As a region, Latin America presents perhaps the fewest problems to those engaged in arriving at a world disarmament formula. The 20 American Republics are relatively lightly armed. None presently possesses nuclear weapons. Moreover, there appears to be no political problem in the area of such magnitude that its existence would preclude a disarmament agreement. In the current world situation, the geographic position of the area seems to diminish the possibility that any Latin American Republic will become a major object of contention although, as in other regions, there is the ever-present danger of Communist subversion and aggression.

However, the area is not without possible points of friction. One of the chief sources of political tension in Latin America appears to be the practice of exiles from one state using a neighboring state as a base for military operations to gain power in their own country.[108] In the cases of the settlement of disputes between Latin American nations outlined earlier, the charge was made by one government that a neighboring state was harboring exiles who were equipping themselves with arms in preparation for a revolution or civil war.

There are other inter-American disputes and rivalries, for instance, those over territories or boundaries, which conceivably could affect the willingness of the Latin American states to reduce their arms. Thus even though the regional peace-keeping system has diminished the necessity of maintaining large armed forces to deter attack by a neighbor, some inter-American tension remains.

In addition, there are some points of friction which involve nations outside the Western Hemisphere. The Falkland Islands offer an example. Three hundred miles off the southern mainland of Argentina, the islands have been occupied by Great Britain since 1833 but are claimed by Argentina. In theory they could protect the Cape Horn Passage and guard the southern entrance to the Atlantic,[109] but the opening of the Panama Canal diminished their strategic importance in this respect.

The Antarctic is also a possible scene of international friction. Argentina and Chile claim large stretches of the Antarctic continent, as do the United Kingdom, New Zealand, Australia, France, and Norway.[110] Since 1948, the United Kingdom, Argentina and Chile

[107] Recently Eduardo Santos, former President of Colombia, stated in a speech at Columbia University: "Against whom are we Latin Americans arming ourselves? Why are our countries ruining themselves buying arms which they will never use? * * * We have no reason to fight one another; we have only reasons to live together in peace and harmony.

"Have we perhaps a military role to play in the great international world conflicts? This is an attitude worthy of a Tartarin which could not be kept up for 5 minutes. In this day of the atom bomb, with the new arms whose cost is fabulous, with technical systems involving thousands of millions, what are our poor countries about, bankrupting themselves on armaments which in the event of an international conflict would spell absolutely nothing. Then, what we are doing is building up armies which weigh nothing in the international scale but which are Juggernauts for the internal life of each country. Each country is being occupied by its own army." (Del Rio, Angel, ed. Responsible Freedom in the Americas. New York: Doubleday & Co., Inc., 1955, pp. 200–221.)

[108] For examples, see above, pp. 7–8.

[109] Roucek, Joseph S. Geopolitics of Antarctica and the Falklands. World Affairs Interpreter, spring, 1951, vol. XXII, No. 1, p. 44.

[110] Jenks, C. Wilfred. An International Regime for Antarctica? International Affairs, October 1956, vol. 32, No. 4. Royal Institute of International Affairs, London, p. 416. Although the United States has never filed a formal claim to any part of the Antarctic Continent, considerable interest on the part of the Government has been maintained in it. In a letter dated, March 28, 1957, to Robert C. Hill, Assistant Secretary of State, Senator Theodore Francis Green, chairman of the Senate Foreign Relations Committee, inquired whether the Department of State "feels that recent developments in that area make it appropriate to clarify United States policy toward Antarctica * * * [and] that at the appropriate time 'Executive and congressional action' might 'be coordinated along whatever lines appear most desirable.' "

have had an agreement, renewed each year, to refrain from sending warships south of 60° of latitude.[111] The Indian Government has voiced concern that a 20th century scramble for the Antarctic will create new tensions between the big powers, and has asked that the United Nations consider the Antarctic problem.[112] But Argentina and Chile have resisted attempts to carry the question to the United Nations. In the meantime, concern has been voiced in Argentina over the possibility of the installation of naval-military bases and the conducting of atomic experiments in the region.[113]

EFFECT OF CURRENT DISARMAMENT PROPOSALS ON LATIN AMERICA

Negotiations for disarmament have been directed primarily to preventing a third world war by bringing under control the armed forces and armaments of the major powers. However, the proposals introduced in the negotiations have also encompassed other countries.

The armed forces and armaments of smaller states are especially important in regional conflicts and in localized aggressions. Moreover, the development of defense pacts, such as the Rio Treaty, and the formation of military alliances among Communist states have, in varying degrees, rendered the military strength of states within these groupings a factor to be considered in establishing the ceilings for the major powers. As long as its allies are not in a position to defend themselves adequately in case of aggression, the United States must consider this in establishing its force levels. On the other hand, if the military strength of its allies is such that they can make a real contribution toward regional defense, then the United States may be able to make a reduction in its forces without risk to the free world.

The United States draft working paper for the first stage of a disarmament program, presented to the United Nations Subcommittee on Disarmament on April 3, 1956, suggested that a preparatory armaments regulation commission be established by the five members of the Subcommittee (United States, United Kingdom, France, Canada, and the Soviet Union). After these states had taken certain preparatory measures, such as the installation of an inspection and control system, the working paper proposed that the Disarmament Commission "be requested to invite other states having a significant military potential to join in an armaments regulation organization.[114]

For each state, according to the working paper, a reduced level of armaments, armed forces, and military expenditures for the first phase would be established. This level would be "considerably below" the ceiling set for the four major members of the Subcommittee (2,500,000 each for the United States and the Soviet Union and 750,000 for France and the United Kingdom), and would not exceed 500,000 men except in the case of China (which would be permitted 2,500,000 troops) or unless "special circumstances" required an exception. In fixing the levels, account would be taken of "agreed criteria, including demographic, geographic, economic, and political factors." Inspection and control obligations would then apply to these states too.

[111] Jenks, C. Wilfred, op. cit.
[112] Kaskeline, Egon. Soviets Push Efforts To Snatch Polar Edge. Christian Science Monitor, October 20, 1956, p. 7.
[113] Whitaker, Arthur P. Argentine Upheaval. Praeger, New York, 1956, p. 103.
[114] United Nations Document DC/83, annex 6. The Disarmament Commission is composed of the members of the Security Council plus Canada. Two seats on the Security Council, and hence also on the Disarmament Commission are always filled by Latin American states.

The "proposed synthesis" submitted at the same time by the United Kingdom and France left the levels of all states to be agreed upon later, and in respect to the smaller states, said only that the levels should be "considerably below" the levels fixed for the five permanent members of the Security Council.[115]

The proposals presented by the Soviet Union during the 1956 disarmament negotiations set the maximum for countries other than the major powers at 150,000 to 200,000 each.[116]

Since none of the Latin American states has armed forces approaching 500,000, the United States proposals would not affect the size of any of their armed forces. The Soviet proposal would at most require only minute reductions on the part of the larger South American states, and even this effect could probably be readily offset by modernization and training to increase the effectiveness of the remaining forces permitted under an agreement.

ELIMINATION OF FOREIGN BASES

The security of the Western Hemisphere might also be affected if the frequently repeated Soviet proposal "to liquidate within 2 years the foreign military, naval and airbases in the territory of other states," were ever adopted.[117] Although disarmament discussions have never reached the point of specifying what constitutes a foreign military base, the United States does maintain two bases in Latin America which have some military significance. One is the United States Naval Base at Guantanamo, Cuba. This is considered an essential peacetime training base for the United States Navy.

The second United States base in Latin America is a training base in Panama. In addition, military installations have been erected and maintained by the United States in the Panama Canal Zone as a means of insuring the availability of the Panama Canal, not only to all the countries of the Western Hemisphere but to nations all over the globe. The security of the United States, Latin America, and the entire free world would suffer severely if their access to the canal were denied or curtailed in any way.

CONTROL OF ARMAMENTS

Thus far proposals for the reduction and control of armaments of the smaller powers have not been spelled out in any detail. The United States working paper of March 1956 for the first stage of a disarmament system suggested that all states having a significant military potential agree on a reduced level of armaments and reduce to this level by destroying armaments under the supervision of international inspectors, the salvage material to be used for peaceful national purposes.[118] Proposals by the Soviet Union have called for the reduction of armaments by the smaller states, but they have not indicated the levels to which armaments would be reduced or the manner of their reduction.

The Latin American States, with the possible exception of Argentina and Brazil, appear to be largely dependent on foreign sources for

[115] United Nations Document DC/83, annex 2. As of this printing the proposals do not appear to have been changed substantially in this respect.
[116] United Nations Document DC/83, annex 5.
[117] Soviet statement of November 17, 1956. New York Times, November 18, 1956, p. 33.
[118] United Nations Document DC/83, annex 6.

their armaments. One method of controlling armaments in Latin America, therefore, would be through control of the arms traffic. For many years the United States and other nations have regulated private arms shipments on a unilateral basis. The United States began applying controls on exports of arms to Latin America even before it established a system for regulating all commercial arms exports in 1935. Beginning in 1905 the United States on several occasions applied arms embargoes or other restrictions with a view to promoting stability and discouraging revolutions in Latin America.[119] In this hemisphere, 17 of the 21 republics are bound by the Pan American Convention of February 20, 1928, concerning the duties and rights of states in the event of civil strife, to prohibit the export of war material to any unrecognized revolutionary groups in a contracting state.[120] A draft protocol to this convention defined the obligation of a state to include keeping under surveillance and prohibiting the exportation or importation of war material which it has reason to believe is intended to start or promote civil strife in another American state.[121]

Continuing international supervision and control of the traffic in arms has never been established although there has been some international cooperation on the matter. At the end of the First World War, there was a great deal of discussion of the control of arms traffic as a method of arms control, and two international conventions providing for a system of national licensing and publicity for the exportation of arms and munitions were negotiated but never came into effect.[122]

Since the Second World War very little emphasis has been given to the control of arms traffic as a method of disarmament. Nevertheless, in regard to those nations which do not manufacture all of their own arms, the control of arms traffic could reduce their source of supply and control their levels of armament. Unless the security of the nonproducing states was assured by other means and an arms control system was instituted over the major powers any limitation of the supply of arms might eventually force nonproducing states into manufacturing arms for themselves.[123]

International control over the arms traffic would not necessarily involve a reduction of the arms trade. However, in the Western Hemisphere it could mean agreement by the American Republics for the most effective utilization possible of arms purchases for the defense of the Hemisphere.

CONTROL OF ATOMIC ENERGY

Proposals on the control of atomic energy would have at the present time little direct effect on Latin America since none of the Latin American Republics possesses atomic weapons. However, each may eventually receive technical information concerning the peaceful uses of atomic energy and fissionable material under the United States

[119] Stedman, Murray S. Exporting Arms. New York, Kings Crown Press, 1947, p. 2.

[120] Ibid., p. 163. The states which have ratified this convention are Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, the United States, and Uruguay.

[121] The protocol was opened for signature May 1, 1957. Text available from Pan American Union.

[122] One of these, the Geneva Arms Traffic Convention of June 17, 1925, was ratified by the United States in 1935.

[123] The American delegation which negotiated the Geneva Arms Traffic Convention felt it would be futile to attempt to restrict the volume of the trade in arms because it might force arms production by all powers. See: Collection of Documents, p. 808.

bilateral "atoms for peace" program and the proposed International Atomic Energy Agency. The sharing of fissionable materials envisioned in these programs might be increased if countries now possessing nuclear armaments diverted, under a disarmament agreement, some of the fissionable material in these weapons to peaceful uses.

All the South American countries with the exception of Ecuador, Paraguay, and Bolivia have bilateral agreements with the United States for cooperation in the peaceful uses of atomic energy. However, the agreement with Ecuador, which is not effective, is awaiting statutory approvals. In Central America and the Caribbean there are agreements with Guatemala and the Dominican Republic. Similar agreements with Cuba, Costa Rica, and Nicaragua are in various stages of being approved.[124] Moreover, all the Latin American states would be eligible to participate in the International Atomic Energy Agency when it comes into being.[125] Both of these programs will provide safeguards to assure that the materials supplied under them will be used only for peaceful purposes. Nevertheless, the fact that these and other countries may someday have the skill with which to manufacture atomic weapons points up the necessity of achieving some system of international control of atomic energy before more countries have an opportunity to produce and surreptitiously stockpile atomic weapons.

The principal result disarmament proposals might have on Latin America, however, lies in the effect they would have on the ability of the United States to aid in the defense of the hemisphere. If an agreement weakened that ability without providing an acceptable substitute security system, the freedom of Latin America, like that of the United States, would be jeopardized. On the other hand, if a disarmament agreement led to the reduction of international tension and decreased the possibility of a nuclear holocaust, then Latin America, like the United States, would reap many benefits.

G. Concluding Observations

The place of Latin America in today's world points up the important relationship of disarmament, security, and peaceful settlement. In the area there has evolved a system which goes a long way toward establishing inter-American security through the substitution of peaceful settlement for excessive armaments. The Organization of American States along with the Rio Pact constitutes the only regional organization which provides the members with machinery to settle their political disputes by peaceful means. The existence of this regional organization machinery has fostered a security for Latin American nations from a wide variety of dangers, including attack from outside the Hemisphere, conflict with neighbors, and interference by the largest power in the area—the United States.

The great diminution, if not removal, of the early security problems facing Latin America has freed the countries from the necessity of maintaining huge defense establishments. It has allowed the several republics to concentrate more on the development of their economies and on the larger problems of hemispheric defense and world collective security.

[124] Information from the Atomic Energy Commission.

[125] The statute of the International Atomic Energy Agency was approved at an international conference on October 23, 1956. The statute has been referred to the signatory governments for ratification.

Latin American countries, to defend themselves from foreign attack, are relying on cooperative measures with the United States to strengthen the defensive capabilities of the Western Hemisphere, and on the United Nations in its efforts to build a workable system of collective security.

Current disarmament proposals of the major powers, if adopted, would not result in a reduction of Latin American armed strength. A reduction of armaments within a region, however, need not always await a universal agreement on arms control. It is possible that with greater coordination of the regional defense functions of the individual countries, the size of their armed forces and armaments could be reduced. Such a step would redound to the economic and political well-being of Latin American nations.

ATTITUDES OF SOVIET LEADERS TOWARD DISARMAMENT—REPLIES FROM EXPERTS ON THE SOVIET UNION TO SUBCOMMITTEE QUESTIONNAIRE

STAFF STUDY NO. 8

JUNE 6, 1957

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PREFACE

By Senator Hubert H. Humphrey, Chairman

Negotiations on disarmament appear to have taken an encouraging turn. The change in atmosphere surrounding the London talks now in progress is attributed largely to a recognition of certain circumstances resulting in a modification of Soviet attitude, and partly to a more flexible attitude on the part of the United States. Although it is still too early to say whether negotiations now underway will lead to some limited first measures for inspection and arms reduction, it is important to examine what considerations may be moving the Soviet leaders to take arms control more seriously.

This study presents some of the factors influencing the attitudes of the leaders of world communism. It represents the thinking of authorities who have studied Soviet affairs for many years. While they made their replies to a subcommittee questionnaire at the beginning of this year—prior to the current disarmament negotiations—their statements provide an enlightening background against which to view the proposals now under discussion.

If the Soviet attitude toward arms control has become more serious, I believe there are compelling considerations that may be influencing the Soviet leaders in that direction. These considerations stem from pressures both inside and outside the U. S. S. R.

Among the primary pressures affecting the attitude of the Soviet leaders is the awareness that the new weapons are so destructive that in an all-out war all nations, including their own, might perish. It is becoming more apparent that the Soviet leaders are finding it to their interest to avoid starting or being drawn into a new war. They have shown profound concern in recent months over the eventuality that the United States will achieve an intermediate range ballistic missile before the Soviet Union achieves an intercontinental ballistic missile. This would place the Soviet Union at a strategic disadvantage, for it would be vulnerable to the 1,500-mile missile from our overseas bases but would not yet have acquired the 5,000-mile missile which would make the United States vulnerable from Soviet bases. The anxiety of Soviet leaders is reflected in the campaign of threatening our allies with warnings that guided missiles with nuclear warheads must not be stationed on their territories.

Furthermore, the Soviets have begun to recognize that neither external blandishments on the part of the U. S. S. R. nor internal dissension has resulted in the disintegration of NATO and other free-world alliances. These remain intact and the Russians know that with our strength in Europe and with our bases located in key spots in the world we are prepared to help defend free countries against aggression. They know that if a Soviet attack is launched, we can respond with devastating counterattack from many bases.

The Soviet hierarchy may also be worried about the danger, increasingly imminent, when other nations—some not so responsible as the United States and Britain—may possess nuclear weapons. It must be as obvious to them as it is to us that unless some international agreement over the new weapons of mass destruction is reached soon that nuclear arms in the hands of an irrational dictator may one day threaten the world.

Soviet leaders are undoubtedly concerned about the explosive situation that exists in East Germany and in other satellite countries. If the East Germans should rise up as did the people of Hungary against their Soviet and puppet rulers, the West Germans, the Soviet Army, and ultimately American and Western forces stationed in Germany and Berlin could be drawn into the conflict. The Communist leaders may not intend to give up control in that area, but they could well be serious in seeking some arrangement that would lessen the possibility of conflict.

The experience in Hungary, as well as Poland, must have brought home to them most forcefully that they could not rely on either the satellite troops or the satellite peoples. Furthermore, it may have raised serious doubts about the reliability of their own troops in the event of war, especially those of non-Russian origin. Thus war could present an internal threat to their regime as well as an external threat to the nation. Moreover, the Soviet leaders must be concerned over their loss of prestige and acceptance due to their ruthless suppression of the revolt of the Hungarian people.

In addition to the reasons why it is in the interest of the USSR to avoid war, there is evidence of economic problems inside the Soviet Union which may cause the Soviet leaders to seek limited arms control. The low birth rate and high infant mortality rate during the war years are now resulting in a serious manpower shortage in the Soviet Union that will become even more aggravated in the next few years. The Soviets must be finding it difficult to supply men for their armed services as well as for industry and agriculture. The cost of spending more and more to develop modern weapons also appears to be pressing the Soviet economy. Mr. Khrushchev seems to believe that reorganization of the Soviet economy in the direction of administrative decentralization will make the economy more viable. It seems highly unlikely, however, that the Soviets would begin such a drastic reorientation of their economy with all its consequent dislocations and uncertain results unless they expected a period of peace.

While these reasons may be motivating the Soviet leaders to avoid war and to bring about some slowing down, if not termination of the arms race, the question remains as to how far they would go in accepting effective arrangements for arms control. Significant in this study, for example, is the extent to which the authorities on Soviet affairs stress the difficulty for the Soviet leaders to accept inspection of their territory.

However, the pressures on the Soviet rulers which I have noted may be forcing them to consider measures that are antithetical to the basic nature of their regime. At the same time, the evaluation by the Soviet experts of the problems which the Soviet Union would have in accepting even limited inspection must cause us to proceed cautiously in considering Soviet proposals on inspection.

While the Soviet Union apparently is showing new interest in a limited arms agreement, we should not expect the Soviet leaders to diminish their cold war tactics. On the contrary, we should expect them to persevere with and even increase their broad emphasis on political, economic, and psychological competition. They may decide against blowing the world to bits but their strategy continues to emphasize absorbing the world bit by bit.

With such sober warnings in mind we can proceed to hard bargaining with the Soviet Union about limited measures of arms control that may lead progressively to more comprehensive disarmament. We cannot trust the Soviet Communists, but we can seek arrangements that do not involve good faith to be effective and workable, arrangements which are self-enforcing, adequately inspected, and which are mutually advantageous. We should make every effort to achieve agreement on whatever measures of effective arms control that may be possible with the Soviet Union without endangering our security or that of the free world.

This study, the eighth compiled at my request, offers varied interpretations of some of the key problems confronting those who must negotiate with the Soviet Union about disarmament. The summary was prepared by Dan Jacobs of the subcommittee staff. Neither the summary nor the replies of the Soviet authorities necessarily reflect the views of the subcommittee or any of its members.

JUNE 6, 1957.

ATTITUDES OF SOVIET LEADERS TOWARD DISARMAMENT

I. SUMMARY

A. Introduction

A key to reaching agreement on the control and reduction of armaments is the attitude of the Soviet leaders. Their readiness to negotiate seriously about disarmament is bound to be influenced by the extent to which they estimate that they and their own power are threatened by the danger of nuclear war. Their willingness to agree to effective measures for the control and reduction of weapons depends greatly on their attitudes toward inspection and enforcement. Their decisions on disarmament are affected by political and economic pressures within the Soviet Union and in the various countries of Eastern Europe under Soviet domination.

In an attempt to acquire an informed opinion regarding the attitudes of the Soviet leaders, the chairman of the Subcommittee on Disarmament, in December 1956, sent the following questions to some forty authorities on the Soviet Union throughout the United States.

1. It is sometimes assumed that a tacit understanding has been reached by all the major powers regarding the impracticality of nuclear warfare as a means of settling international disputes. *Are there grounds for believing that the leaders of the Soviet Union do recognize the threat of mutual annihilation created by the new weapons? To what extent, if at all, has this assumption entered into the formulation of policy and recent acts of the Soviet Union? What are the possibilities that the leaders of the Soviet, either now or in the foreseeable future will recognize a mutuality of interest in preventing nuclear war and seriously seek agreement on control of weapons?*

2. United States disarmament policy holds that measures for the control and reduction of armaments are not possible without effective inspection. The Soviet Union has only agreed thus far to accept limited ground inspection at transportation and communication centers in the Soviet Union and aerial inspection for Eastern Europe. *Given the present situation and the political structure of the Soviet Union, is there any possibility of reaching agreement opening the Soviet Union up to inspection? How far is it likely that the present Soviet leaders would go now in opening their country to inspection? Under what circumstances might they be induced to go farther? If you believe any degree of inspection is unacceptable to the present Soviet regime, what kind of changes would have to come about in the U. S. S. R. or*

outside the Soviet Union before there would be willingness on the part of the Soviet Government to consider agreement involving such inspection? Can you envisage such changes occurring in the near or distant future?

3. Most Western proposals for control and reduction of armaments envisage some sort of enforcement agency that would consider and deal with violations of the disarmament agreement. *To what extent would the present regime in the Soviet Union be willing to submit to and abide by such an enforcement agency? To what extent would any Soviet regime in the foreseeable future be willing to agree to such an enforcement agency?*

4. The Western Powers and the Soviet Union have proposed a number of times, in various forms, the establishment in central Europe of a zone in which the strength of armed forces would be fixed by agreement. The Soviet Union, as part of a wider disarmament program advanced on November 17 proposed the reduction and eventual removal of all foreign forces and bases from nations participating in both the NATO and Warsaw alliances, this to be supervised by aerial and ground inspection.

Under what conditions would the Soviet Union be willing to withdraw its troops from Eastern Europe? What is the likelihood of further developments in the direction of liberalization in the Eastern European countries and how might this affect the Soviet Union's readiness to consider the creation of a neutral belt through Europe or otherwise limit and control arms in a zone including the captive nations? To what extent is the domination of the Soviet Union over the countries of Eastern Europe dependent upon the presence of the Red Army within or near the borders of these nations? How would a marked reduction of the size of Soviet forces or other kind of disarmament control affect Soviet influence over the Eastern European countries?

5. Secretary of State Dulles, in testimony before the Subcommittee on Disarmament on February 29, 1956, stated that "there is some reason to believe that the Soviet Union itself would greatly welcome relief from the present burden of armament." He further stated: "The cumulative effect of their military burdens plus these new economic burdens they are at least going through the motions of taking (proffers of assistance to other nations) is such that the Russian people and the satellite people are in a state of very considerable dissatisfaction, and I believe, that, not only because of what is said, but because of the logic of the case, that the Soviet Union would like to be relieved of some of its military expenditure, so it could devote more of its economic productivity to raising the living standards of its own people and the satellite peoples and perhaps have more money to spend on its foreign aid." *What comment do you have on this statement? To what economic considerations, if any, can the announced Soviet troop reductions of 1,800,000 men be attributed? Is there anything in present Soviet economic*

trends that would indicate a need for relief from the present level of arms production? To what extent is the structure and adaptability of the Soviet economy such that it could make the adjustment required by an appreciable reduction in production of armaments with greater or less ease than that of the United States? Are there any apparent difficulties involved in such a transition that might require the Soviet Union to go slow on any disarmament process?

6. What type of controls would be most workable and effective over the Soviet military establishment? What are the legitimate security interests of the Soviet Union which should be taken into account on disarmament planning?

The recipients of this questionnaire were advised that they should consider the questions as suggestive rather than as exclusive. As some of them specialize in particular aspects of Soviet affairs, such as the economy of the Soviet Union, it was also suggested that, if they chose, their comments could deal primarily with those areas in which they might have special competence. Some responded only to a single area of questions but most made responses to a number of the problem areas.

This document contains a summary as well as the complete text of the replies. The summary seeks to draw together some of the common threads of agreement and to point out some of the comments which seem to have special relevance for the control and reduction of armaments.

Inevitably any such summary has its limitations. Most of the replies contained extensive presentations which make an adequate correlation of the responses difficult. Except in those instances where there was wide agreement among the respondents on a specific point, each point of the analysis has been footnoted so that the opinion of the authority cited can be traced to its original context.

B. Influence of Nuclear War on Soviet Policy

Soviet recognition of the threat of mutual annihilation

Most authorities on Soviet affairs who replied to the subcommittee's question as to whether the Soviet leaders recognize the threat of mutual annihilation created by the new weapons stated the belief that the leaders of the Soviet Union do recognize this threat. One cited as evidence the increased attention that is being given within the Soviet Union to preparing the population for the possibility of atomic attack.[1] Another voiced the opinion that Soviet statements and articles in the press indicate that the Soviet leaders do not intend to hide from their people any longer the vast destructiveness that a nuclear war would bring.[2] Others mentioned that it is probable that the leaders have been made aware of the potentiality of the new weapons by their scientists, as scientists in the Soviet Union are accorded considerable respect and, since the death of Stalin, have been less afraid to speak out.[3]

It was stated, however, that Soviet leaders have made contradictory statements regarding the possible consequences of nuclear warfare.

[1] See Brzezinski, p. 376.
[2] See Kulski, p. 400.
[3] See Meyer, p. 412; and Timasheff, p. 438.

Malenkov, for example, in March 1954 said that war with "the contemporary means of warfare means the destruction of world civilization," but in April of the same year, stated that war would lead "to the collapse of the capitalist social system." Molotov, the following year, in February 1955 said, "It is not 'world civilization' that will perish, however much it may suffer from new aggression, but the decaying social system of which blood-thirsty imperialism is the core." [4] Another respondent asserted that we do not always know what weight to attribute to the opinions of the various leaders of the Soviet Union who participate in policymaking.[5]

Some respondents warned that psychological differences between Soviet leaders and leaders of Western nations toward the annihilation of large masses of people must be taken into account in this matter. As one stated:

> Men like Khrushchev, Bulganin, Molotov, and Malenkov have been conditioned to witnessing masses of men liquidated and to the realization that they were personally responsible for this destruction in detail and in gross. Consequently, while the prospect of the destruction of themselves and of their empire is indeed a most serious deterrent, any feeling of humanitarian horror for what would happen to mankind in general or even to the Russian people as a whole is not a major factor in their calculations and feelings. * * * [6]

While it was generally believed by most of the respondents that Soviet leaders do recognize the threat of mutual annihilation posed by all-out nuclear warfare, important qualifications were made in some of their answers as to the significance of this recognition for preventing war. It was noted that nuclear war need not be precipitated deliberately but might grow from a small war in which one belligerent resorted to nuclear weapons in an act of desperation.[7] Others warned that although Soviet leaders recognize the dangers of modern warfare it would be imprudent to assume they would preclude war as a means of achieving their goals,[8] or that they would refrain from creating situations which might lead to war.[9] One respondent contended that Soviet intervention in Hungary was an example of Soviet readiness to risk general war rather than allow a change in the international status quo to the prejudice of the U. S. S. R.[10] Further, it was felt circumstances might arise within the Soviet Union which would override the Soviet leaders' interest in preventing nuclear war, such as an internal crisis which the ruling leadership felt could be resolved without loss of their power only through war.[11]

EFFECT OF NUCLEAR WAR THREAT ON SOVIET POLICY AND ACTS

Most respondents expressed the opinion that an awareness of the threat of nuclear destruction on the part of Soviet leaders has entered into the formulation of policy and acts of the Soviet Union in recent

[4] See Reshetar, pp. 432 and 434.
[5] See Timasheff, p. 438.
[6] Hoover, p. 389; see also Poppe, p. 417.
[7] See Bauer, p. 371; and Kertesz, p. 392.
[8] See Timasheff, p. 438.
[9] See Kertesz, p. 392.
[10] See Kulski, p. 401.
[11] See Kluckhohn, p. 398; Ulam, p. 441.

years. Some maintained that this has long been a factor in Soviet foreign policy,[12] though doubt was expressed by some that Soviet leaders are influenced by the danger of destroying civilization.[13]

One representative view was that the Soviet leaders' recognition of the possibility of mutual annihilation—

> is reflected in a growing Soviet tendency to rely on indirect, rather than direct aggression, to pursue their aim of world domination by a series of nibbling moves, no one of which seems serious enough to warrant the risk of nuclear warfare, rather than by a spectacular direct attack calculated to precipitate war.[14]

One respondent elaborated this view as follows:

> It would be foolish on the part of the Soviet leaders to risk everything on one card of a general war while they expect to advance their cause by peaceful means. Moreover, they seem to believe that the same cause will be promoted over a period of the next two decades by other nonmilitary developments. They rely on the Soviet relatively higher rate of industrialization regarding the production of capital goods and on the industrialization of China and to some extent also of eastern Europe. This is why they constantly talk about the U. S. S. R. eventually becoming the first industrial power of the world as their eventual target. * * *
>
> If it is true that the Soviet leaders expect that time is working for them, then it is logical for them to formulate such foreign policies which do not clash with the nuclear stalemate. However, it is probable that they would not accept a change in the present international status quo to the prejudice of the U. S. S. R. and would then be ready to face the risk of general war. * * *[15]

A number of recent acts were pointed to as indicating that the leaders of the Soviet Union were proceeding with caution in order not to precipitate general war. One writer went back as far as noninterference by the U. S. S. R. in the Berlin airlift to support this view.[16] Also cited as further instances of this cautiousness was noninvolvement of the Soviet Union directly in the Korean and Indochinese wars and in the Formosa dispute.[17] It was also remarked that:

> The Soviets, despite their brutality in Hungary, and their threats regarding the Middle East, displayed their usual caution.[18]

The fact that the Soviet Union threatened to send volunteers to Egypt rather than regular forces was cited as an instance in which Soviet leaders exercised restraint in view of the nuclear threat.[19] However, the same authority warned:

> But Shepilov's simultaneous ultimatum to England and France which, if misregarded, could have resulted in global

[12] See Barghoorn, p. 366; Ulam, p. 441.
[13] See Poppe, p. 416; Wolfe, p. 442.
[14] See Chamberlin, p. 383.
[15] Kulski, p. 401.
[16] See Timasheff, p. 438.
[17] See Langer, p. 407; Timasheff, p. 438.
[18] Barghoorn, p. 426.
[19] Timasheff, p. 438.

> war shows that there is a limit beyond which the Soviet leaders would not retreat. There is no doubt that if NATO forces would have entered Hungary to help her people win against communism, the reaction of the Soviets would have been A- and H-bomb attack against the United States. * * * [20]

Another respondent commented that—

> * * * it is my own impression that they are restricting their interference in Hungary to the minimum regarded imperative to hold the Communist bloc together. * * * [21]

A contrary position to the foregoing was stated, however, to the effect that the Communist dogma of the Soviet leaders—

> does not allow room in their day-to-day thinking for the idea that mankind could destroy itself utterly.[22]

SERIOUSNESS OF SOVIET LEADERS ABOUT CONTROL OF WEAPONS

Opinion was divided on whether the Soviet leaders would seriously seek agreement on the control of weapons either now or in the foreseeable future. The question asked whether they might be led to this by recognizing a "mutuality of interest in preventing nuclear war." Two respondents emphasized that while the leaders of the Soviet Union recognize the advantages of preventing nuclear war, they are in no sense motivated by the idea of mutuality of interest—"the very concept of mutuality is alien to them." [23]

Doubt about Soviet readiness to seek arms control seriously was expressed by a number of the authorities.[24] Reasons given were such considerations as the rigidity of Soviet foreign policy, and the U. S. S. R.'s unwillingness to permit inspection of the U. S. S. R.

Among those who thought the Soviet leaders would seriously seek agreement on control of weapons, some added significant qualifications. One suggested it is possible they would seek such agreement—

> at a time when their relationship with other Communist countries is appreciably worsening and it appears to them desirable to reduce the hopes of American military aid to those countries.[25]

A number of respondents expressed the opinion that Soviet leaders might be willing to consider control over nuclear weapons if it allowed them to retain what the respondents assumed is their superiority in conventional forces.[26] However, another made the following observation:

> It must be clear to the Soviet leaders that their present position of military equality with the United States rests solely on their possession of thermonuclear weapons. Do away with them and with atomic weapons as well, and the U. S. S. R. will once again be second best. Nevertheless, I believe they are, or could be, interested in the total abolition of

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[20] Timasheff, p. 438.
[21] Langer, p. 408.
[22] Wolfe, p. 442.
[23] Inkeles, p. 390; see also Meyer, p. 412.
[24] See Cattell, p. 379; H. Fisher, p. 386; Kluckhohn, p. 398; Kulski, p. 402; Poppe, p. 417.
[25] Berman, p. 375.
[26] See Bauer, p. 371; Brzezinski, p. 376; Langer, p. 408.

> atomic and thermonuclear warfare. * * * Some would challenge my assertion that Soviet military equality depends on their possession of thermonuclear weapons. They would point out that, assuming the absence of such weapons, the Soviet orbit would face the West with a vast manpower superiority. The relative weight of manpower in overall military potential, however, is at least debatable. While Soviet superiority in this field cannot be disputed, the United States, even without thermonuclear or atomic weapons, would still have an overwhelming superiority in industrial potential. In addition, it must be remembered that the U. S. S. R. has some degree of superiority because of America's greater vulnerability, especially as long as both of the big powers continue to possess nuclear weapons. By the time the U. S. S. R. will have caught up with the United States in industrial potential, the power structure of the world will have changed sufficiently to make all present calculations meaningless.[27]

C. Inspection

Soviet attitudes toward inspection of the U. S. S. R.

Nearly all Soviet authorities who discussed the question of inspection for the control of armaments expressed the opinion that the present regime in the U. S. S. R. would not agree to the kind of effective inspection of the Soviet Union usually envisaged as part of a comprehensive disarmament agreement. Most stated their conviction that the present leaders not only would not but could not agree to such inspection. Some did, however, describe circumstances or conditions which might at some future date lead to the possibility of inspection.

Various reasons were given for this unwillingness and inability of the Soviet rulers to open their nation to international inspection. Some said that—

> Inspection * * * strikes at the very heart of any controlled state.[28]

and—

> Such a system of inspection would * * * undermine the internal system of political controls essential to the perpetuation of the present regime * * *.[29]

Two mentioned the reluctance of the Soviet leaders to permit contact between the population and inspectors continuously stationed in the Soviet Union as well as their need to maintain the myth of the superiority of their system by not letting the free world get a good look at how it works and not letting their people get a good look at the rest of the world.[30] Others spoke of the forced labor camps which the Soviet Union could hardly open up to inspection and the unwillingness of the Soviet rulers to allow continuous observation of other nonmilitary aspects of the country such as industry.[31]

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[27] Meyer, p. 413.
[28] Barghoorn, p. 367.
[29] Reshetar, p. 435; see also Kulski, p. 402.
[30] See Hoover, p. 389; Wolfe, p. 444.
[31] See Hoover, p. 389; Kulski, p. 402; Poppe, p. 417; Reshetar, p. 435; Ulam, p. 442; Wolfe, p. 444.

One stated the opinion that "a system such as the Soviet has an inherent tendency toward a paranoiac fear of foreign subversion, and foreign inspection would be viewed by it as merely another form of espionage."[32] Others expressed similar beliefs.[33] It was further pointed out—

> that the secrecy mania is characteristic not only of the Communist regime, but has been for centuries one of the most outstanding character traits of Russia.[34]

A number of respondents noted that the Soviet Union enjoys certain advantages over the United States and the West in intelligence activities.[35] One said that the U. S. S. R. has succeeded in keeping much of its military structure a secret while the United States has already made public a large part of its military establishment. Another valuable asset the U. S. S. R. would lose by opening up to inspection, it was contended, is that of forcing the other powers to commit errors of overestimation and underestimation of the true potential of that country.

One respondent proposed the thesis that "Soviet aversion to inspection has been a serious barrier to any agreement to control weapons primarily—

> * * * because the Soviet leadership has not attached very great importance to such an agreement.[36]

Another suggested that "open skies"—

> offers the greatest hope of acceptance by the Soviet Union because it does not involve close inspection, agents moving freely around the country, or any actual reduction of arms.[37]

CONDITIONS THAT MIGHT LEAD TO PROGRESS TOWARD INSPECTION

Some of the experts suggested that progress might be made toward inspection under certain conditions. One, for example, stated that it would have to be developed gradually, piece by piece, and not in one overall agreement. He considered that the rate of progress toward an inspection agreement depends on the state of world tension, as tension goes up the possibility for inspection goes down.[38]

Another respondent, who warned that it seems unrealistic to expect the rulers of the Soviet Union to commit political suicide, said that any concessions made by the U. S. S. R. in the direction of inspection would be of very fundamental importance. It was his opinion that it might be possible to achieve progress toward this goal if we are modest and realistic and avoid the extremes of pessimism or aggressive pressures. Conditions which he suggested as promoting the possibility of inspection would include the reduction of international distrust and perhaps agreement on a general European settlement along with some sort of neutralized zone in Central Europe.[39]

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[32] Brzezinski, p. 377.
[33] See Berman, p. 375, Cattell, p. 379.
[34] Possony, p. 424.
[35] See Brzezinski, p. 376; Cattell, p. 379; Kulski, p. 402.
[36] Berman, p. 375.
[37] Cattell, p. 381.
[38] See H. Fisher, p. 386.
[39] See Barghoorn, p. 367.

One respondent expressed the opinion that the Soviet Government would probably accept comprehensive and effective inspection only under the pressure of great necessity,[40] while another suggested:

> Real inspection is a very threatening idea to them, but they may go along even on this point if it is the ultimate obstacle to secure international agreement with regard to the nuclear issue.

This was qualified, however, by the observation—

> What we must be prepared for, however, is that they will take every possible measure to see to it that the arrangements entered into are in fact nonmutual, that is restrict us in a way that increases their security without in fact restricting them in a comparable degree * * *.[41]

Other circumstances that might influence the attitude of the Soviet leaders toward inspection were given as—

> an international situation which from their point of view is worsening, plus strong indications on our part that we do not intend to exploit the situation to deliver a crushing blow * * *.[42]

or

> * * * if, on the basis of convincing reports of experts, they would come to the conclusion that the relationship of military strength was changing against them.[43]

Others, though expressing doubt about the Soviet leaders' willingness to agree to inspection, suggested they might go along with some inspection measures for tactical purposes or without being completely in good faith.[44]

POSSIBILITY OF CHANGES IN THE SOVIET UNION

As for the possibilities of changes that might bring about a greater willingness on the part of the Soviet Government to consider an agreement involving effective inspection, few conjectured about such changes or the likelihood of when they might occur. One stated:

> I cannot envisage changes in the Soviet Union which would bring about a greater willingness to permit effective inspection, short of another Russian revolution * * *.[45]

Another expressed the opinion:

> Only a prophet could speculate on the probability of a deep change of the regime in the U. S. S. R. So far the present regime does not seem to be in the immediate danger of being overturned and replaced by another which would resemble even from afar a western democracy. As to a "peaceful" evolution, no regime evolves peacefully to the

[40] See Langer, p. 408.
[41] Inkeles, p. 391.
[42] Berman, p. 375.
[43] Timasheff, p. 439.
[44] See Kluckhohn, p. 398; Langer, p. 408.
[45] Meyer, p. 414.

> extent of denying its basic nature. For the time being the regime is not altered basically and goes on as before except for some Stalinist trimmings. Moreover, a quick and successful revolution in the U. S. S. R. would not guarantee that a new regime governing a strong Russia would be necessarily more accommodating than the present. Only a protracted revolution and civil war would have the effect of making Russia more accommodating, because she would simply be weaker * * * [46]

One respondent however, speculated that "changes made for tactical reasons may escape from the control of the Communist operators." He stated that—

> Since I do not exclude the possibility of serious transformations in the Soviet Union which would lead eventually to a changed attitude toward the West, I consider as a possibly promising sign, the acceptance by the Soviet Union of an aerial inspection for Eastern Europe and limited ground inspection at transportation and communication centers in the Soviet Union and possibly even the withdrawal of the Russian Army from East Central Europe. The real problem in such an agreement is the quid pro quo involved * * * [47]

However, he also stated that—

> basic transformations in Soviet leadership will not take place overnight. The dream of a sincerely cooperating Soviet Union belongs to the distant future. Until that time, Soviet leaders will not be impressed by arguments unsupported by overwhelming force.

D. Enforcement

Soviet willingness to accept enforcement agency

Nearly all who responded to the question on enforcement stated that in their opinion the present regime in the Soviet Union would not be willing to submit to and abide by an enforcement agency established to deal with violations of a disarmament agreement. Nor did they express expectation that any Soviet regime would be likely to do so in the foreseeable future. One respondent did suggest, however, that if a—

> really hard-hitting, sweeping proposal—

were made to the Soviet Union—

> the ensuing dilemma might even lead to internal political changes favoring the establishment of effective inspection and enforcement. [48]

Such opinions as the following were expressed about the willingness of Soviet leaders to submit to an enforcement agency:

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[46] Kulski, p. 403.
[47] Kertesz, p. 393.
[48] Meyer, p. 414.

> As long as there is a Soviet regime in Russia, no basic change can be anticipated;[49] * * * In any case it is inconceivable that [they] would do so excepting under direct pressure of circumstances.[50]

One mentioned as a future possibility in connection with enforcement, that—

> * * * if revolutionary trends in various parts of the globe continue to point to further Soviet expansion, then the U. S. S. R. might be more willing to accept some sort of disarmament in order to prevent an armed reaction from the western side when faced with a crisis situation in a number of crucial areas.[51]

A number of respondents stressed that the Soviet leaders fear that the West would dominate the machinery of enforcement and so would insist upon having the right to veto, as in the Security Council.[52] One stated, for example:

> The acceptance of any kind of enforcement agency by the Soviet rulers is unlikely so long as they continue to place stress, as they have so far, upon national sovereignty in their brand of international law. * * * The Soviet proposal of May 10, 1955, was vague on the point of enforcement, confining itself to the following statement: "The control [inspection] agency makes recommendations to the Security Council on measures of prevention and suppression as regards violators of the convention on reduction of armaments and prohibition of atomic weapons." This provision follows logically from the Soviet view of the United Nations, expressed from the moment of its founding, that that organization is based upon the principle of the unanimity of the permanent members of the Security Council. Thus the Soviet view implies that the Soviet Union as a great power cannot really be held to account and cannot have sanctions imposed upon it without its consent. Acceptance of an enforcement agency by the Soviet rulers would involve radical revision of their views on international law and organization.[53]

E. Eastern Europe

WITHDRAWAL OF SOVIET TROOPS FROM EASTERN EUROPE

For the most part the authorities on the Soviet Union saw little likelihood that the Soviet leaders would be willing to withdraw their troops from Eastern Europe, although some thought they might consider such a move under certain conditions.

Among the conditions mentioned as ones which the Soviet leaders might require for the withdrawal of their troops from Eastern Europe were: The withdrawal of American troops from Germany and West-

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[49] Possony, p. 426.
[50] Langer, p. 408.
[51] Brzezinski, p. 377.
[52] See Cattell, p. 380; Kulski, p. 403; and Poppe, p. 418.
[53] Reshetar, pp. 435–436.

ern Europe [54] (one thought such withdrawal would have to be from any place in the world outside the United States); [55] abandonment of the rearming of Western Germany and of its inclusion in the North Atlantic Treaty Organization, as well as the neutralization of Germany; [56] recognition by the West of the East German Soviet regime as a coequal in negotiations with the Federal Republic of Germany; [57] disbandment of NATO; [58] conclusion of a nonaggression pact between NATO and the Warsaw Pact powers or an overall settlement of the cold war entailing among other things the neutralization of Europe; [59] assurance that "national Communist governments" of the type of Gomułka's in Poland would be in power in Eastern European countries, not non-Communist or anti-Communist governments; [60] provision that Eastern Europe not be turned into a NATO base or a zone of influence for a reunited and rearmed Germany; [61] or only after the satellites are firmly integrated into the Soviet system.[62] It should be stressed that these conditions were suggested by a number of different respondents and the possibility of the withdrawal of Soviet troops was not necessarily meant as contingent upon all of them being realized.

A number cited the Soviet repression in Hungary as an indication that the Soviet Union would be unwilling to withdraw from Eastern Europe.[63] One respondent, who linked political control to the presence of Soviet forces, stated his view of the probable Soviet attitude:

> * * * a great power does not welcome the establishment of what it considers to be outposts of enemy power in its own security zone. For this reason, together with the factor of economic exploitation of this area, and also the advantages of coordination of the Soviet economy with that of the so-called Socialist camp and also because the Soviets do not like to see any area lost to Communist control for reasons of national pride, it is obvious that Moscow will not willingly give up its control of any of these countries.[64]

However, another respondent suggested alternative possibilities for the Soviet reaction following the Hungarian revolt:

> On the one hand, recent events in Hungary and Poland might make Soviet leaders less willing to withdraw their troops. They must now realize the extreme unpopularity of Soviet-dominated regimes in these countries and realize that Soviet domination would not survive troop withdrawal. On the other hand, the Soviet leaders might now in desperation be willing to jettison their whole satellite position in Eastern Europe on its present basis before they are confronted with a series of major uprisings in all the satellite countries.[65]

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[54] See Berman, p. 376; Chamberlin, p. 384; Fisher, p. 386; Hoover, pp. 389 and 390; Langer, p. 408; Reshetar, p. 436; Ulam, p. 442.
[55] See Poppe, p. 419.
[56] See Berman, p. 376; Barghoorn, p. 368; Chamberlin, p. 384; H. Fisher, p. 386; Ulam, p. 442.
[57] See Reshetar, p. 436.
[58] See Poppe, p. 419.
[59] See Reshetar, p. 436; and Meyer, p. 414.
[60] Chamberlin, p. 384.
[61] See Brzezinski, p. 377.
[62] See Poppe, p. 419.
[63] See Cattell, p. 381; Kluckhohn, p. 399; Kulski, p. 403; Meyer, pp. 414 and 415; Timasheff, p. 440.
[64] Barghoorn, p. 368.
[65] Hoover, p. 390.

Among those who saw the latter alternative as a possible Soviet response to the situation in Eastern Europe, one suggested that—

> * * * conditions may well develop in some of these countries to the extent that the Kremlin may think it advisable to withdraw its forces completely. It could probably do this with relative safety, as it could easily proceed to military reoccupation if necessary and in any event could profit from the threat of aerial bombardment (conventional or nuclear) which is always at its disposal. * * * [66]

CHANGES IN EASTERN EUROPE AND SOVIET RESPONSE

A few indicated they thought that pressures for liberalization of the existing regimes or a lessening of control by the Soviet Union would continue within the countries of Eastern Europe.[67] Most respondents, however, emphasized the probable Soviet reaction to such pressures. One said, for example:

> Further anti-Soviet developments in the satellite states are very likely, but it is as likely that the Soviets will intervene to prevent the overthrow of Communist governments. The situation in Eastern Europe probably will not follow one single direction, but for many years will display many ups and downs. * * * [68]

Another warned that, while there is probably good long-term prospect for liberalization of some kind in the area—

> * * * if liberalization is carried out under the direction of the Soviet Union, the area may gradually be incorporated in a vast empire, and its people will probably be Russified.[69]

The recent experiences in Poland and Hungary were cited as not likely to encourage the Soviet leaders in any further liberalization in Eastern Europe.[70]

One respondent stated:

> * * * The policies which the Soviet leadership was following in late summer [of 1956] indicated that they felt that control by coercion had become uneconomical, using the word "uneconomical" in the largest possible sense as referring to the total use of Soviet resources. Events in Hungary underscored, of course, the fact that release of external controls, while meeting some needs of the population, also can unleash the tensions which had been built up under preexisting conditions. * * * [71]

Another made the following comment:

> The type of development which has been going on in Poland cannot but reduce Russia's influence there and also remove whatever hopes the Russian command may have had concerning the reliability of the Polish Army in crisis. I think that the Polish development is not unique and with a

[66] Langer, p. 408; see also Berman, p. 376.
[67] See Barghoorn, p. 368; H. Fisher, p. 387; Possony, p. 427; and Ulam, p. 442.
[68] Possony, p. 427.
[69] Barghoorn, p. 369.
[70] See H. Fisher, p. 386; and Kulski, p. 405.
[71] Bauer, p. 370.

> reduction of the size of Soviet forces, Soviet influence, in terms of actual control over their satellites, is likely to wither away. There are a few qualifications to the above statement: Thus the Russians have obviously hoped to compensate for their diminishing physical control over the satellites by establishing stronger ideological and self-interest bonds. I am not worried about the strength of ideological and self-interest bonds, for in my opinion they are not likely to prove to be the decisive factor in retaining those countries' allegiance to the Soviet Union. On the other hand, the U. S. S. R. may play such angles as economic help and capitalize, e. g., on the fact that up to now she alone of the great powers has supported Poland's frontier with Germany. All in all, barring the unexpected, Russian influence over the European satellites is bound to diminish in the long run.[72]

NEUTRAL BELT THROUGH CENTRAL EUROPE

Those who commented on the Soviet Union's readiness to consider the creation of a neutral belt through Europe, including Eastern Europe, saw very little possibility that the Soviet leadership, now or in the foreseeable future, would be apt to consider such a move seriously.[73] There was such comment as:

> * * * the plan of creating a neutral zone in central and east central Europe must be considered quite unrealistic. Very conclusive is the reaction of the Soviet leaders to the demand of neutrality on the part of the leaders of the Hungarian revolution: the countries of the Warsaw pact were told that they could not be allowed to part company.[74]

However, some did suggest circumstances which might lead to more favorable consideration of this proposal on the part of the Soviet leaders:

> * * * it is not inconceivable that within 10 or 15 years—possibly even less—there could be enough change in the internal power structure within the U. S. S. R. so that a truly neutral zone could be created in central Europe. I think this is most unlikely in the foreseeable future—and this includes eastern Germany. As I think the present leaders (and possible leaders of the immediate future) to have mapped out their "limits of tolerance," they would risk all-out war rather than lose control of East Germany which they consider as essential to their security as we do, say, the Panama Canal or Cuba.[75]

and:

> If for one reason or the other, the Soviets feel that it is too costly, unproductive, impractical, or militarily useless to maintain control over a satellite, they might negotiate an American quid pro quo for withdrawal. In general, the

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[72] Ulam, p. 442.
[73] See Kluckhohn, p. 399; Poppe, p. 419; Possony, p. 427; Reshetar, p. 436; Timasheff, p. 440.
[74] Timasheff, p. 440.
[75] Kluckhohn, p. 399.

> Soviets, due to their geographic proximity to eastern and central Europe, have less to lose from a neutral belt than the United States. Therefore, they can risk playing around with this idea, even though, in my opinion, they do not have the slightest intention of leaving. * * *[76]

DEPENDENCE ON SOVIET ARMY OF SOVIET CONTROL OVER EAST EUROPE

There was general agreement on the necessity of the presence or the proximity of the Soviet Army to maintain Soviet-dominated regimes in the eastern European countries.[77] Some difference was noted in the degree and kind of domination by the U. S. S. R. over the various nations in East Europe.[78] One authority, for example, said:

> The presence or the proximity of Soviet troops is very important, I believe, in maintaining Soviet domination in East Germany, Poland, Czechoslovakia, and Hungary. It may be less important in Rumania and Bulgaria and much less in Albania.[79]

It was also pointed out that even if the Soviets were to withdraw their troops from the territories of the eastern European countries, they could still concentrate the forces just behind the borders and so support pro-Soviet, Communist regimes.[80]

Similarly, it was generally assumed that a marked reduction in Soviet forces would weaken Soviet control over the eastern European countries.[81] Merely a reduction of U. S. S. R. forces on the territory of the satellite nations without withdrawal of Red army troops, however, would not necessarily end Soviet domination over those countries, it was pointed out.[82]

F. Soviet Economy

BURDEN OF ARMAMENTS ON THE SOVIET UNION

Many of those replying to the question asking whether the Soviet Union would welcome relief from the present burden of armaments said they thought it would. A number emphasized the need the Soviet leaders may feel to meet the demand for consumer goods.[83] One declared that they would consider the need to meet this demand, not for humanitarian purposes, but to consolidate their own position.[84] Another also thought that the Soviet leadership would like to provide more consumer goods for the Soviet people in order to strengthen political support for the regime, although he believed it would be a mistake to attribute Soviet armaments policy to any pressing economic needs. He asserted there was this difference between the Soviet Union and the countries of Eastern Europe:

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[76] Possony, p. 427.
[77] See Barghoorn, p. 368; Brzezinski, p. 377; Cattell, p. 381; Chamberlin, p. 384; H. Fisher, p. 387; Hoover, p. 390; Kertesz, p. 305; Kulski, p. 404; Langer, p. 408; Meyer, p. 415; Poppe, p. 419; Possony, p. 426; Timasheff, p. 440; Ulam, p. 442.
[78] See Barghoorn, p. 368; Brzezinski, p. 377.
[79] H. Fisher, p. 387.
[80] See Timasheff, p. 440.
[81] See Barghoorn, p. 368; H. Fisher, p. 387; Ulam, p. 442.
[82] See Hoover, p. 390; Possony, p. 427.
[83] See Bergson, p. 372; Berman, p. 376; H. Fisher, p. 387; Langer, p. 409; Ulam, p. 442.
[84] See Bauer, p. 370.

> * * * the effect of the more liberal policies of the post-Stalin regime has been one thing at home, where the Soviet people seem to have responded in general with gratitude, and another in Eastern Europe, where they have been taken as signs of weakness and the people have responded with demands for more * * *[85]

It was also suggested that the Soviet leaders might welcome relief from the burden of armaments in order to put greater effort into the development of industrial potential that would later mean greater military strength.[86] Other comments suggested that a reduction of armaments would also make it possible for the U. S. S. R. to give more technical and economic assistance to underdeveloped countries,[87] and that the leaders might agree to such reductions to appear peaceful.[88]

Another stated that while the Soviet regime would like to be relieved of some of its military burden, it should be clear that the long-run objectives of the Soviet Union have not profoundly changed:

> They still look forward to and regard it as one of their prime responsibilities to move the world as rapidly as possible toward communism.[89]

It was also maintained by one authority on Soviet affairs that in his estimation—

> this entire set of questions does not address itself properly to the basic facts of Russian and Soviet psychology, but reflects American procedures and thought patterns.

In this connection he also said:

> The Soviet mentality is not like the mentality of American businessmen, and it is conceivable that the Soviets, far from considering military expenditures as burdens, like the Prussians of previous centuries regard military strength as their main and preferred industry. Military power can be a very considerable economic asset and the Soviets are quite aware of this.[90]

While many replies did state the belief that the Soviet leaders would welcome relief from the burden of armaments so as to be able to respond to the pressures from the population for consumer goods, an important qualification was expressed to this view by one respondent. While this authority on Soviet affairs was among those requesting that his answers to the subcommittee's questions not be published, permission was granted for publication of the following portion of his reply without attribution:

> * * * It can be argued, I think, that the Soviet Government has no really free hand in determining the share of consumption in total national output. It is quite reasonable to suppose that in reality that Government must move between the upper and the lower limit of a rather narrow zone.

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[85] Berman, p. 376.
[86] See Kulski, p. 405; Possony, p. 428.
[87] See H. Fisher, p. 387.
[88] See Barghoorn, p. 396; H. Fisher, p. 387.
[89] Inkeles, p. 391.
[90] Possony, p. 428.

Clearly, they cannot, except in the case of war, reduce consumption below what is required to maintain the physical stamina of the population. But, on the other hand, strange as it may sound, I believe that the Soviet dictatorship cannot afford to raise consumption above a certain limit. Let me explain briefly what I have in mind.

No government, however ruthless and powerful, can function without a certain minimum of acquiescence on the part of the governed. The instruments of domination at the disposal of such a government, such as the secret police or the Army, can prevent plots, conspiracies, underground resistance; they can suppress an open rebellion. They cannot deal with a universal discontent which would express itself in general passive resistance. Monopolistic use of propaganda is much less effective than is generally thought. In particular, the idea of present sacrifices for the bliss of future generations has long lost its effectiveness in Russia * * * Yet, as long as the Government can represent itself as acting to protect the country against "foreign aggression," against "capitalist encirclement," and the like, people may be willing to suppress their basic disaffection and to lend the Government the modicum of acceptance which it needs. In other words, a dictatorship of this type cannot function except in an atmosphere of stress and strain. The high rate of investment, the high military expenditures—and, obversely, the low rate of consumption—are, therefore, part and parcel of the political system, a precondition for its continuation in power. Rapid increase in consumption would not evoke the gratitude of the population for the regime. In the looking-glass world of the dictatorship, any significant relaxation would arouse the pent-up demand of the consumers for still further increases, and it would almost inevitably raise the basic issue of freedom. Such an increase would be very likely to augur the disintegration of the dictatorship * * *

Other comments presenting views explaining why the Soviet leaders might seek a cutback in armaments include:

* * * On the other hand, it is true that the Soviet economy is now entering a phase where some painful decisions must be made. They [the leaders] will have to raise, to a degree at least, living standards, and there is clearly a conflict between current military expenditures and investment and growth rates. The maintenance of a rapid growth rate is becoming militarily crucial since, due to technological developments, the Soviet strategic planners probably consider that the main conflict with the United States will take place only in the next or in a subsequent technological cycle. To the extent that by maintaining huge armaments now they may inhibit industrial growth, they could jeopardize their future technological posture. If this is their thinking, they might be willing to reduce current expenditures somewhat in order to strike a better balance between present and future military requirements. If so, this would be a rearrangement of armaments schedules, but not a change of priorities, and cer-

tainly not an attempt to substitute foreign economic aid for a strategy based on military power. By the same token, it might not be in the true interest of the free world if we were to assist them, through armament-limitation agreements, to solve one of their most difficult strategic problems.[91]

An analysis of the problem which the Soviet leaders may be having in offering their people sufficient incentives to keep up the high rate of industrialization follows:

I think there is no doubt that the Soviet leaders are under great pressure for reduction of their present armament burden. Western observers have seldom seen in proper perspective the remarkable achievements of the Soviet economy, and its equally marked deficiencies. The rapid expansion of Soviet industry and the growth of Soviet military power was accomplished by a formula which placed preeminent emphasis on strong social controls and which deemphasized the spontaneous sources which hold a liberal society together and enable it to function effectively. The success of this formula, as judged against the criteria of industrial and military expansion, cannot be questioned as far as performance over the past two decades is concerned.

While succeeding in its primary objectives, the Stalinist formula I have been describing above failed to reduce, and, in fact, increased, many internal tensions within the system: the population's demand for a better standard of living and freedom from arbitrary arrest, management's demand for greater autonomy (if only to better carry out their own tasks in the Soviet state), and the intellectual's desire for a greater degree of freedom of inquiry.

The effect of these pressures can be seen in both Soviet domestic and international policy. While there is certainly no clear evidence that the Soviet leaders are aiming at creating a welfare state, policy since Stalin's death indicates a continuing vacillation between the desire to grant greater concessions to the population and the reluctance to abandon the older way of doing things for fear that immediate industrial and military goals will be prejudiced. The dilemma in this situation, if I read these vacillations correctly, is that it's clear to the Soviet leadership that if they are to convert their society into an effectively functioning productive unit over the long haul, they must do more to reward the material interests and aspirations of their own populace, but that they can follow this course only at the risk of prejudicing their short-run industrial and military goals, and possibly risking many of the present political forms * * *.[92]

Another respondent, however, while recognizing the pressures for improved living standards, thought these needs might be satisfied without necessarily any reduction in arms production:

* * * while there are very real economic incentives for reductions in defense outlays, it would be wrong, I feel, to

[91] Possony, p. 428.
[92] Bauer, p. 369.

> suppose that there are irresistible pressures. The Soviet economy is growing rapidly. Despite all their difficulties, Stalin's successors so far have been able to maintain a high rate of growth in industry. As overall growth is realized, it becomes ever easier to support a given level of defense outlays. Even an increase in defense outlays may allow for larger allocations to capital investment and consumption, if only the increase is held below the rate of overall growth of the economy generally.
>
> Stalin's successors have found it possible so far to continue high-tempo industrialization and make some concessions to consumers while still supporting a vast military effort. In view of the record to date, it would be wrong to think that they cannot continue to do so in the future. * * *[93]

ECONOMIC CONSIDERATIONS OF SOVIET FORCE REDUCTIONS

The economic consideration most often cited as explaining, at least in part, Soviet reductions in forces—if such cutbacks have, in fact, taken place—was the shortage of manpower in the U. S. S. R.[94] Others thought the announced reductions could be only partly attributable to economic pressures,[95] while some expressed the view that it would be a mistake to attribute any reductions to economic causes.[96] It was also pointed out that a trend toward the use of atomic weapons may have made possible a lowering of the levels of Soviet armed forces.[97] In any event, it was thought that the Soviet economy would benefit from such a reduction.[98]

One opinion, expressed by an authority on the Soviet economy, stated:

> Considering the Soviet secrecy, one hesitates to take at face value the Soviet claims regarding the new cuts in the size of the armed forces. If such cuts are being made, very possibly one consideration was the resultant alleviation of an industrial labor shortage, of which there are many signs. I rather doubt, however, that this alone was decisive. More likely, the cuts reflect a complex of factors, including not least the need to adapt the Soviet armed forces to current changes in military technology.
>
> The foregoing is written on the supposition that the cut in armed forces announced in May 1956 is not being accompanied by any sizable reduction in total munitions procurement. If such a reduction is being made, the question of the relation of the Soviet economy to the Soviet military effort I feel would require review.[99]

Another respondent said that a shortage in the work force is compelling the cut of 1957 and will compel still larger cuts in 1958, 1959,

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[93] Bergson, p. 372.
[94] See Chamberlin, p. 385; Inkeles, p. 391; Kulski, p. 405; Langer, p. 408; Meyer, p. 415; Possony, p. 429; Reshetar, pp. 437 and 438; Wolfe, p. 445.
[95] See Bergson, p. 373; Hoover, p. 440.
[96] See Berman, p. 376; Poppe, p. 420.
[97] See Kertesz, p. 396; Ulam, p. 442.
[98] See H. Fisher, p. 387; Meyer, p. 415; et al.
[99] Bergson, p. 373.

and 1960. He cited the following figures which estimate the net increase in the labor forces in the year 1950 through 1960:

1950	1,300,000	1956	2,100,000
1951	1,300,000	1957	1,800,000
1952	1,600,000	1958	800,000
1953	2,600,000	1959	300,000
1954	2,500,000	1960	300,000
1955	2,400,000		

These figures were arrived at by taking the birth rate of 16 years earlier, as youths reach a working age at 16, and subtracting from this the rate of diminution of the working force by death, old age, illness, youths not gainfully employed, and similar causes. The figures then arrived at showed the net difference between new youths entering employment at 16 and older workers dropping out of the labor force. The significance of these figures, it was pointed out, is that the years 1953 through 1956 reflect an increased number of births during the prosperious period in the U. S. S. R. from 1937 through 1940 as well as other factors favorable to a marked increase in the labor force. The sharply reduced estimates during the years 1957 through 1960, however, reflect the greatly reduced birth rate coupled with the high infant mortality rate in the U. S. S. R. during the war years of 1942, 1943, and 1944. The authority on Soviet affairs who submitted this information concluded on the basis of these figures that—

> The Kremlin must either abandon its plan for the sixth 5-year plan in industry and agriculture or else cut out its armies and concentration-camp populations. Or which is not unlikely both at once.[100]

ADAPTABILITY OF SOVIET ECONOMY TO ARMS REDUCTION

Opinion was mixed on the question of the ease or difficulty with which the economy of the Soviet Union could adjust to any appreciable reduction of armaments. A number of respondents stated the opinion that such a transition could be made either with little difficulty or with greater ease than in the case of the United States.[101] Two limited their comment to the observation that the Soviet Union would not encounter great difficulties in shifting manpower from the military into the civilian economy.[102] One did not think it would be any easier for the U. S. S. R. to adjust to an appreciable reduction in armament production than the United States, citing the vast Soviet bureaucracy as not insuring a smooth or swift adjustment.[103]

One respondent, who warned that no one really knows how adaptable the Soviet economy would be in such circumstances, emphasized the difficulties that might result if any cutback in arms production were accompanied by a shift to the production of consumer goods:

> * * * It must be pointed out * * * that a centrally planned economy functions most effectively in the area of heavy and military industries, and that its performance is least satisfactory in those economic fields which require decentralization, flexibility, responsiveness to customer's de-

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[100] See Wolfe, p. 445.
[101] See Bergson, p. 373; Chamberlin, p. 385; Hoover, p. 390; Kulski, p. 406; Timasheff, p. 430.
[102] See Meyer, p. 416; Ulam, p. 442.
[103] See H. Fisher, p. 387.

> sires, and large distribution mechanisms. As presently constituted, it is my belief that the Soviet economy cannot effectively adopt the satisfaction of consumer's needs as its primary objective. In any event, the vast buildup of light industries, transportation systems, and internal and external trade facilities would require a far-reaching reorganization of the entire Soviet society, in a manner which may be politically undesirable to the Soviet Government. Perhaps all this is feasible, but such changes of the economic structure would require many years. * * *[104]

G. Control of Soviet Armaments

CONTROLS ON SOVIET MILITARY ESTABLISHMENT

Differing replies were made to the question as to the type of international controls that would be most workable and effective over the Soviet military establishment. Two respondents doubted that any controls over the Soviet military establishment acceptable to the Soviet Government would be either workable or effective.[105] Another warned that almost any form of control can be obstructed and, if necessary, defied.[106] This respondent suggested that the key factor is confidence, and, while the United States has a moral as well as practical obligation to explore every proposal for a reduction of armaments, the more important objectives must be to remove or alleviate hostility and, insofar as possible, build up a measure of mutual confidence.

Another warned that in the contemporary U. S. S. R. policy is still being made by individuals whose basic character was formed in a revolutionary atmosphere and in a situation of isolation from the rest of the world. He said:

> Hence to speak of "controls * * * over the Soviet military establishment" strikes me as unrealistic for the immediate future. I would urge that we press for whatever disarmament and inspection we can obtain so long as we do not allow the U. S. S. R. to make too shrewd a horse trade.[107]

It was the opinion of this authority on the Soviet Union that as all social systems evolve through time and the Soviet system has by no means remained static up to the present point—

> * * * much to our advantage can happen over the next 10 to 15 years and the aim of wide disarmament and mutual inspection on the necessary scale may become realistic.

Those who discussed the type of controls that would be needed to be effective over the Soviet military establishment included one who stated that, given the strategic and logistical characteristics of the Soviet military establishment, mobile and unrestricted ground control teams with freedom to travel throughout the U. S. S. R. would be necessary.[108] Another emphasized that unlimited aerial inspection

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[104] Possony, p. 429.
[105] See Chamberlin, p. 385; Timasheff, p. 440.
[106] See Langer, p. 409.
[107] Kluckhohn, p. 400.
[108] See Brzezinski, p. 377.

would be an indispensable minimum and that it must be supported by strong ground control units also without limitations on access to any facility at any time.[109]

One respondent listed the following types of controls as most likely to be workable and effective:

> (*a*) Those designed to make a surprise attack with intercontinental missiles impossible;
>
> (*b*) A step-by-step reduction of forces under arms;
>
> (*c*) The establishment of a supervisory body under the U. N. in which countries are represented that are incapable of aggression and are greatly concerned to be relieved of the danger of war * * *.[110]

Another also recommended that only a thoroughgoing system of inspection under the direction of an international agency could be effective and workable over the Soviet military establishment.[111] Still another warned that—

> the only effective controls for the time being, when you have to deal with a totalitarian system, are the type of controls which would be self-enforceable and the violation of which would be immediately detected, e. g., physical removal of Russian troops from Eastern Europe and Eastern Germany, and (if this be technically possible and desirable to us) prohibition of nuclear tests.[112]

SECURITY INTERESTS OF THE SOVIET UNION

It was asserted that the legitimate security interests of the Soviet Union are the same as those of any other state, such as assurance against external attack and internal subversion,[113] and that any disarmament agreement must be based on full and unmitigated reciprocity as to the rights, procedures, and operations of the mutual control establishments.[114]

Some respondents, however, stated that "legitimate security interests" means something quite different to the Soviet Communists than it does to people in the West.[115] One suggested the Soviet interpretation would consider such interests as those being advantageous to the U. S. S. R. and detrimental to the other side.

Among the conditions that were suggested as legitimate security interests in the eyes of the Soviet leaders were a guaranty of the frontiers of the U. S. S. R., and assurances that the Soviet Union would not be attacked by any other nation or group of nations, nor would any nation officially support activities directed against the Soviet regime.[116]

Another respondent expressed the opinion that the Soviet rulers would consider their security interests as including military superiority on the Continent of Europe and domination of the satellites, and

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[109] See Possony, p. 430.
[110] H. Fisher, p. 387.
[111] See Kertesz, p. 398.
[112] Ulam, p. 442.
[113] See Barghoorn, p. 369.
[114] See Possony, p. 430.
[115] See H. Fisher, p. 388; Kertesz, p. 398; Poppe, p. 421.
[116] See Poppe, pp. 420 and 421.

that the minimum they would be willing to accept would be the security of the Soviet frontiers of 1945 and demilitarization of the region extending from those frontiers to the western sphere of interest.[117] A similar view was expressed that the Soviet concept of "legitimate interests" includes not only the security of Soviet national territory but also the perpetuation of the division of Germany and control of Eastern Europe.[118] One respondent warned that a rearmed and reunited Germany poses an important psychological factor in Soviet thinking that cannot be disregarded, so that in any disarmament planning a disarmed Germany should be given high priority.[119]

One authority on Soviet affairs said:

> The basic problem with regard to the Soviet military forces is not that of assuring them of their ultimate security under any circumstances, but of assuring them of their security under the unique political objectives of the Soviet system at large. Only a change in those objectives would enable one to significantly reformulate the problem.[120]

One response stressed that the territorial extent of the U. S. S. R. should be taken into consideration for it justifies the maintenance of a proportionately large army.[121] Another indicated that it is as much to the Soviet interest as ours to achieve atomic disarmament.[122]

Another respondent stated his opinion that in disarmament planning no regard can be paid to the particularistic interests of the individual nations on security.[123]

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[117] See Ulam, pp. 442–443.
[118] See Kulski, p. 406.
[119] See Brzezinski, p. 377.
[120] Inkeles, p. 391.
[121] See Kertesz, p. 398.
[122] See Bauer, p. 371.
[123] See Timasheff, p. 441.

II. REPLIES OF AUTHORITIES ON SOVIET AFFAIRS

Reply of Prof. Frederick C. Barghoorn, Department of Political Science, Yale University, January 13, 1957

* * * Before beginning my detailed answers, I should like to point out that it is really impossible to answer these questions, in view of the lack of communication between the Soviet leaders, and Soviet public opinion, if one may use such a term, on the one hand and the non-Soviet world, although I believe that a few of our diplomats, such as Mr. Bohlen, probably know as much about Soviet thinking as an outsider can.

With regard to the first question, I would say that there are grounds for believing that the leaders of the Soviet Union recognize the decisive threat created by super weapons. The most open indication was a statement by Malenkov when he was the Chairman of the Council of Minister of the U. S. S. R., I believe in 1954, to the effect that a new war would "destroy civilization." Since Malenkov's resignation from the post of Premier the Soviets have taken the line that a new war would destroy only "capitalism." His return to supreme power might strengthen the forces of reasonableness in Moscow, though he is a shrewder opponent than Khrushchev.

However, I have not the slightest doubt that the Soviet leaders realize as well as the leaders of other major powers that modern weapons, if used on a large scale, mean suicide for civilization. In my opinion, Soviet policy has always been based as much on fear of war as on any factor. This belief was confirmed in my mind by my visit to the Soviet Union last summer. This does not mean that the Soviets are in any sense pacifists. They are convinced that the "capialist" countries would destroy them if they dared, and they believe that they must be militarily powerful in order to prevent such an occurrence. In many ways, it seems to me that the situation between the Soviet Union and the United States resembles that which existed between Germany and England in 1914. Fortunately, there is today a much greater understanding on both sides of the dangers of large-scale war. As for recent Soviet actions, I believe the record speaks for itself. The Soviets, despite their brutality in Hungary, and their threats regarding the Middle East, displayed their usual caution. The one disquieting element in the situation is the possibility that as time goes on the old caution may be reduced. There was some indication that this might already be the case in the belligerency of some of Khrushchev's statements. However, I believe that his statement that the Soviets would "bury" the West fits into the old Soviet confidence that "socialism" will in this century replace "capitalism" as the economic and social system throughout the world. It may not have been related specifically to the use of physical force on a large military scale.

This leads to another point. Inherent in Soviet ideology is the belief that a process of social change is occurring throughout the world in which the capitalist, private enterprise system, because of its stability and "contradictions," will be replaced by "socialism." This is the optimistic aspect of Soviet ideology, which in so many ways is deeply pessimistic. I mean, optimistic from the Soviet point of view, of course. However, with respect to this the growing indications of unrest among youth in all Communist countries, with the possible exception of China, about which we know so little, can give us confidence that the future belongs not to regimentation but to freedom. Here, however, there is perhaps a danger. If the Soviet leaders become desperate may they not make moves which will have incalculable consequences? It will be necessary for us to be wise, cautious and firm in order to keep alive in the minds of men everywhere a realization of the suicidal character of war.

With regard to inspection, I think that we should keep trying but I think that it would be highly unrealistic to expect soon a regime in Russia that would be likely to permit inspection by a West that the Russians have so long been taught to believe is deeply hostile to them. However, I believe that it might be possible to achieve progress toward this goal if we are modest and realistic and avoid the extremes of pessimism or of aggressive pressures. Inspection, like complete freedom of cultural exchange, strikes at the very heart of any controlled state. It seems unrealistic to expect the rulers of such a state to commit political suicide. I think we should realize that any concessions made by the Soviet Union in this regard would be of very fundamental importance. Here again, we must avoid the extremes of demanding too much on the one hand or of failing to ask for enough. We obviously cannot give up the means of retaliation, on which our own security rests, until an effective inspection system is accepted by all powers. But progress toward this goal depends upon relaxing international tensions, as well as upon many other factors. Nobody can be certain whether inspection will ever be accepted by any Russian government, but it does seem possible that if international distrust could be reduced somewhat the possibilities might be greater. Perhaps also there might be a possibility of moving toward this goal if a general European settlement could be reached, in which some sort of neutralized zone in Central Europe could be established. This could only be acceptable to us if adequate safeguards against violations were developed. We must remember that, while Western Europe is probably not capable at present of defending itself against Soviet attack, on the other hand the Soviets are probably genuinely afraid of the possibility of a Western European-German-United States military combination. This may be the reason why they are not willing to make the concessions to the satellite countries which in so many ways would be in their own interests. Of course there are many reasons, besides those connected with overall world strategic considerations, why the Soviets feel reluctant to give up their control of an area the resources of which they have been exploiting.

With regard to point three, concerning establishment of an enforcement agency for a disarmament agreement, I must say that I

am skeptical whether any state is willing to entrust its security to such an agency. I wonder whether it was not because of a feeling that disarmament proposals along these lines would not get very far that the United States proposed the "open skies" concept? This would not require any agency to enforce it. It seems realistic to accept the fact that an enforcement agency would represent the interests of the states composing it. Small powers could furnish the personnel, perhaps, but the experience of the Korean Armistice Commission makes one wonder about the possibility.

With regard to point four, the removal of Soviet troops from Eastern Europe, some of my statements already made are pertinent, but I shall consider this question in some detail here. Conditions vary among the satellite states. For example, Czechoslovakia seems to be rather quiescent. The Communists have retained control in Albania despite the fact that it is not contiguous to any Soviet-controlled country. On the whole, however, it seems pretty clear that removal of Soviet armed forces would be the first step toward eventual establishment of independent governments in the satellite countries. It is difficult to envisage any powerful government in Russia failing to resist a tendency of these countries to become hostile to Russia. Yet that is what would probably happen in some of them if Soviet power were withdrawn. From the point of view of the peoples of these countries, independence would be far preferable to the present situation. I think we have to distinguish between two main factors in analyzing this situation. One is the fact of control by a foreign power, the Soviet Union, and the other is the nature of the Communist internal regime which results from Russian control. As believers in constitutional government and democracy, we naturally must favor the elimination of Communist, or at least of Soviet, control. But as realistic students of international relations, we must understand that a great power does not welcome the establishment of what it considers to be outposts of enemy power in its own security zone. For this reason, together with the factor of economic exploitation of this area, and also the advantages of coordination of the Soviet economy with that of the so-called "socialist camp" and also because the Soviets do not like to see any area lost to Communist control for reasons of national pride, it is obvious that Moscow will not willingly give up its control of any of these countries. Since this control rests in large measure on the presence of Soviet armed forces, either within the countries concerned, or near them, it is difficult to foresee early withdrawal of Soviet forces without getting something pretty substantial in return.

Many able analysts of European problems now believe that an agreement with regard to Germany might be regarded by the Soviet Union as a sufficient place for withdrawal of its armed forces from this area. If such an agreement were made, we would want to be able to move our forces to areas that would give us a strategic position reasonably comparable to that of the Soviet Union, which, after all, even after withdrawing would still be relatively near to central Europe. Nobody can be sure what the results of negotiation along these lines might be. I am rather pessimistic, but I think that we ought to at least make the attempt. This is very important from the point of view of our own psychological position in the world, in view of fear of war. In any

case, there is probably a good long-term prospect for liberalization of some kind in this area, but if liberalization is carried out under the direction of the Soviet Union, the area may gradually be incorporated in a vast empire, and its people will probably be Russified. It may be impossible to bring this result about, and in this case we may have continual crisis in this area which will be dangerous in the extreme to world peace. It is obvious that the reduction of Soviet armed forces would facilitate solution of this whole problem. With regard to point five, I think it is true that the Soviet Union wants relief from the burden of armament. The Soviets believe that their type of economic system can stand reduction of armaments better than the capitalist system. They attribute our present prosperity to arms production. Furthermore, they are under very great economic pressure, because of a labor shortage and other factors. Finally, they have always cast themselves in the role of champions of world welfare and peace. This is largely demagogy, but it fits into the picture, too. I am certain that the population of the Soviet Union welcomes reduction of armed forces and armament expenditures.

Question six seems to me to be a technical one on which it would not be profitable for me to comment. However, with regard to the legitimate security interest part of it, I would say that these are the same as those of any other state, mainly, assurance against external attack and internal subversion. This is the view of the rulers. Probably it is the only realistic way for an outsider to approach the question, since until the people of the Soviet Union acquire more control over their government, it will be impossible to take public opinion, to any large extent, into account in analyzing the Soviet situation.

REPLY OF PROF. RAYMOND A. BAUER, DEPARTMENT OF ECONOMICS AND SOCIAL SCIENCE, MASSACHUSETTS INSTITUTE OF TECHOLOGY, FEBRUARY 15, 1957

* * * As you are undoubtedly aware, these questions vary greatly in their susceptibility to being answered with any degree of firmness, so let me begin with item 5, an issue on which I believe the evidence is most firm, and proceed from there as far as I feel warranted in addressing myself to the other questions.

I think there is no doubt that the Soviet leaders are under great pressure for reduction of their present armament burden. Western observers have seldom seen in proper perspective the remarkable achievements of the Soviet economy, and its equally marked deficiencies. The rapid expansion of Soviet industry and the growth of Soviet military power was accomplished by a formula which placed preeminent emphasis on strong social controls and which deemphasized the spontaneous sources which hold a liberal society together and enable it to function effectively. The success of this formula, as judged against the criteria of industrial and military expansion, cannot be questioned as far as performance over the past two decades is concerned.

While succeeding in its primary objectives, the Stalinist formula I have been describing above failed to reduce, and in fact increased, many internal tensions within the system: the population's demand for a better standard of living, and freedom from arbitrary arrest, management's demand for greater autonomy (if only to better carry

out their own task in the Soviet state), and the intellectual's desire for a greater degree of freedom of inquiry.

The effect of these pressures can be seen in both Soviet domestic and international policy. While there is certainly no clear evidence that the Soviet leaders are aiming at creating a welfare state, policy since Stalin's death indicates a continuing vascillation between the desire to grant greater concessions to the population, and the reluctance to abandon the older way of doing things for fear that immediate industrial and military goals will be prejudiced. The dilemma in this situation, if I read these vascillations correctly, is that it's clear to the Soviet leadership that if they are to convert their society into an effectively functioning productive unit over the long haul, they must do more to reward the material interests and aspirations of their own populace, but that they can follow this course only at the risk of prejudicing their short-run industrial and military goals, and possibly risking many of the present political forms.

The situation in the satellite areas can give us a key to the situation in the Soviet Union. You ask under what conditions the Soviet Union would be willing to withdraw its troops from East Europe and to what extent domination over the East European countries is dependent upon the presence of the Red Army. The policies which the Soviet leadership was following in late summer indicate that they felt that control by coercion had become uneconomical, using the word "uneconomical" in the largest possible sense as referring to the total use of Soviet resources. Events in Hungary underscored, of course, the fact that release of external controls, while meeting some needs of the population, also can unleash the tensions which had been built up under preexisting conditions. Actually, in terms of my own long run view of trends in the Soviet orbit, the Hungarian revolution—for all of its inspiring display of human courage—may have been as much of a setback for American policy as for Soviet policy.

It seems to me clear that both at home and abroad the Soviet leaders would like, as gracefully and rapidly as possible, to make concessions to the population, not for humanitarian purposes, but to consolidate their own position. This can be done only if they are able to deflect a considerable amount of economic production away from military uses.

Nothing I have said in the foregoing paragraphs should be construed as implying in any way that the Soviet leaders have relinquished any long-run goals for world domination. I am not sure, however, whether in the present context these long-run goals have as much relevance as is ordinarily assumed. Long-run goals become considerably modified as a result of short-run decisions. I have been talking in the foregoing paragraphs about only 1 of the 2 major short-run problems with which the leadership is faced: Whether it be for purposes of maintaining political power, of strengthening their own position for future world domination, or both, they are under considerable pressure to consolidate their own society and area of domination. On the other hand, they are faced with the problem of an armaments race. Mainly as a result of their own behavior in the past, they are faced with an armed group of Western nations. I would not pretend that I was solving the problem, but admit I am only stating it when I say that it would be in our interest to make the Soviet leaders feel freer to disarm.

I must hasten to point to a paradox in this situation. If we facilitate their disarmament, we are likely—in the short-run—to strengthen their domestic position and their position throughout the Soviet orbit. This risk I would be willing to run because of my confidence that the long-run evolutionary trends of communistic society would transform it politically and ideologically. I would not for a moment, however, blanch at the fact that this course of action would not involve risks for us. Communism would in the short-run become a better export product, and international communism would certainly be free to pursue subversion in the free world—perhaps more effectively. These problems would have to be dealt with in their own terms.

I know little or nothing about technical problems of disarmament and control. It seems to me, however, that our major danger in the future does not lie in atomic warfare deliberately precipitated by either side. The danger of atomic warfare seems to lie more in its following from more minor clashes in which one of the parties, fearing that it's losing ground, may feel that it has no alternative but to use the "ultimate weapons." I can see no inherent reason why it is not as much to the Soviet interest as ours to achieve atomic disarmament. As a matter of fact, a very strong case might well be made that they would have less to lose than we would if atomic weapons were relinquished, since the distinctive military and political advantages of communism do not lie in this area.

On the positive side, I would suggest that it should be a cardinal point of American policy to facilitate, to the extent that our own vital interests are not unduly prejudiced, the transfer of the Soviet economy into a consumer-oriented one. This involves among other things encouraging "peaceful Titoism" in the satellite states.

While I have not answered your questions entirely in the terms in which they were posed, I have tried to restrict myself to those areas in which I feel most confident and competent.

Reply of Abram Bergson, Professor of Economics, Harvard University, January 11, 1957

* * * In my studies of the Soviet Union, I have concentrated especially on economic affairs. Accordingly, I feel I should focus primarily on the economic questions you raise in paragraph 5 of your mimeographed statement.

Stalin died on March 5, 1953. In the period since, his successors have publicized numerous claims suggesting that they have been reducing their defense outlays markedly below the cold-war levels established under Stalin. Although the fact is familiar, it deserves underlining that Khrushchev and his colleagues have continued the extreme secrecy that Stalin maintained regarding military matters. Any attempt at an independent appraisal, therefore, encounters formidable difficulties and your committee must reckon that without a radical change in Soviet information policy, the current and future dimensions of the Soviet military effort must be conjectural.

The Soviet Government has published some data, however, and it should be observed that at least until the manpower cut that was announced in May 1956, they do little to support claims indicating any marked cut in defense outlays. According to incomplete budgetary data, which omit defense plant construction and possibly nuclear stock-

piling, the Russians spent on defense in 1952 (the year before Stalin's death) 109 billion rubles. In December 1955, the Government announced that its target for defense outlays for 1956 was 102.5 billion rubles. Since 1952, the Government has initiated a number of price cuts which have reduced military procurement costs materially. Allowing for these cuts, the "real" defense outlays planned for 1956 in all probability exceeded those of 1952.

The announced target for 1956 takes into account the claimed reduction of the armed forces by 640,000 men in 1955, but may not reflect the further reduction by 1,200,000 men which the Government announced in May 1956 would be carried out by May 1957. Allowing for the resultant cut in military pay and subsistence, defense expenditures might have fallen to some 95 billion rubles. According to the May 1956 announcement, armament and military equipment of the armed forces are being cut along with manpower. The Soviet Government, however, has thus far released neither a revised target nor a realized figure for 1956 defense outlays, from which one might hope to find some clue as to whether there was in fact any overall reduction in munitions procurement. In view of the extraordinarily expensive nature of many advanced types of weapons, one cannot rule out that total procurements are increasing. In a talk before the Executives Club of Chicago, Adm. Arthur Radford stated: "I have seen no reduction in military capabilities in spite of announced reductions in manpower."

You ask whether there "is anything in present Soviet economic trends that would indicate the need for relief from the present level of arms production?" The present levels of defense expenditures are onerous, and the Soviet Government certainly could use profitably in other ways the resources they absorb. Stalin's successors are seeking to continue high-tempo industrialization. They also wish to provide the population with better living conditions than Stalin allowed. In pursuing these aims, they are encountering many difficulties, especially in agriculture. The capital investments and consumers' goods needed for continued high-tempo industrial expansion and the improvement of living standards would be more easily obtainable if defense expenditures could be reduced, and the prospects for success in both endeavors would be heightened.

The conflicting requirements of defense, industrial expansion, and current consumption, therefore, continually confront the Soviet leaders with hard choices, but while there are very real economic incentives for reductions in defense outlays, it would be wrong, I feel, to suppose that there are irresistible pressures. The Soviet economy is growing rapidly. Despite all their difficulties, Stalin's successors so far have been able to maintain a high rate of growth in industry. As overall growth is realized, it becomes ever easier to support a given level of defense outlays. Even an increase in defense outlays may allow for larger allocations to capital investment and consumption, if only the increase is held below the rate of overall growth of the economy generally.

Stalin's successors have found it possible so far to continue high-tempo industrialization and make some concessions to consumers while still supporting a vast military effort. In view of the record to date, it would be wrong to think that they cannot continue to do so in the future.

Considering the Soviet secrecy, one hesitates to take at face value the Soviet claims regarding the new cuts in the size of the armed forces. If such cuts are being made, very possibly one consideration was the resultant alleviation of an industrial labor shortage, of which there are many signs. I rather doubt, however, that this alone was decisive. More likely, the cuts reflect a complex of factors, including not at least the need to adapt the Soviet armed force to current changes in military technology.

The foregoing is written on the supposition that the cut in armed forces announced in May 1956 is not being accompanied by any sizable reduction in total munitions procurement. If such a reduction is being made, the question of the relation of the Soviet economy to the Soviet military effort, I feel, would require review.

I have argued provisionally against the notion that economic pressures alone will necessitate a curtailment of Soviet defense expenditures. As is already implied, however, if cuts can be made in defense spending, the Russians are bound to gain economically. There is no likelihood, for example, that the defense cuts would result in any wholesale unemployment and an economic depression. Under the Soviet system of economic planning, the Government exercises a totalitarian control over investments and over economic activity generally. The Government can assure that an expansion in investments and civilian employment would go hand in hand with the cuts in defense.

The Russians make quite a point of the fact that under their planning system disarmament need not cause any economic distress. Without trying to debate their further claim that it would cause acute distress in the West, we must concede that with respect to their system they are essentially right, although the necessary readjustment would certainly involve some difficulties.

Economically, then, the Russians have something to gain and nothing to lose from disarmament. Moreover, while there are no irresistible economic pressures for disarmament, the alternatives between which Khrushchev and his colleagues must continually choose are not by any means fully opposed. By using the cuts in defense outlays as a basis to expand capital investments in heavy industry the Russians actually could expand their future defense potential. Their choice is not simply between "guns" and "butter" but between "guns," "butter," and "machines." The "machines" can be used tomorrow at their discretion to produce either more "guns" or more "butter." If we wish to understand Khrushchev's attitude toward defense cuts, we must keep in mind this aspect, for I feel it is a central one.

By the same token, it must also color our own thinking on disarmament. On the record, if the Russians do give up "guns" they very possibly will in fact choose to produce more "machines" to a great extent rather than more "butter," although no doubt some further concessions would be made to consumers. With more "machines," they will have the capacity in the future to produce even more "guns" than they gave up, if they so choose. In any event, they would have made additional headway toward the realization of their cardinal aim to "overtake and outstrip" the United States. Needless to say, this aspect cannot in itself be an adequate basis for the formulation of western disarmament policy, but we should be remiss to neglect it.

It was gratifying to learn that your distinguished committee is reviewing again the vital question of disarmament. Any future progress in this area must be slow and limited, but I join with those who feel that our Government, without sacrificing the essentials of our security, has an obligation to keep the question open and to be ready at all times to explore sincerely any promising opportunities.

REPLY OF HAROLD J. BERMAN, PROFESSOR OF LAW, LAW SCHOOL OF HARVARD UNIVERSITY, JANUARY 4, 1957

* * * I think the questions you have put are very important and very searching. I was particularly impressed by the fact that you did not merely ask, "What will the Soviet leaders do?" (a question which may suggest a degree of predictability in their actions which in fact does not exist), but you also asked, "Under what circumstances might they be induced to change their present policies?" The latter question implies that Soviet foreign policy is subject to change, and that our own conduct is one of the factors that can influence such a change. I heartily agree with both these implications.

Soviet foreign policy is often viewed as the inevitable product of Marxist-Leninist theory, on the one hand, or, on the other, of Russian imperialism, or of a combination of the two. In my opinion such interpretations are dangerous oversimplifications.

In the first place, the international situation as such, and not merely internal concepts and pressures, plays a decisive role in the determination of Soviet foreign policy just as it does in the determination of the foreign policy of other countries. International relations have a life of their own, which is more than the sum of the foreign policies which constitute it, and which influences those foreign policies.

In the second place, what might be called the psychology of the Soviet leaders—in the deepest sense, the kind of men they are—is at least as important a determinant of their policy, in my view, as the express philosophies or theories of politics and history which they may enunciate. I have in mind such factors as their self-confidence or lack of self-confidence, their capacity or lack of capacity for calm appraisal of realities and rational adaptation to them, their sense of time, their sense of the urgency or lack of urgency for action of one kind or another, the importance or unimportance which they attribute to various forms of international arrangements, their sense of international obligations.

Concretely, the withdrawal of Soviet troops from Austria, the reconciliation with Tito, the granting of some degree of autonomy to Poland, the crushing of the Hungarian revolt, and many other Soviet actions concerning Eastern Europe during the past 2 years, may be artificially reconciled with, but cannot be explained by, the dream of a world Communist order led from Moscow. The fact is that the Soviet leaders have been conducting a retreat in Eastern Europe, a retrenchment, and have been attempting to make that retreat or retrenchment as orderly, as safe, and as inexpensive, as possible. The retreat was undertaken because of the opposition of Eastern European Communist Parties to further oppression by the Soviet Union, and because of the increased economic burdens of maintaining the Soviet Empire—both these factors being aggravated by the Soviet leadership's decision to relax the pressures of "Stalinist" terror both abroad

and at home. Undoubtedly United States policy in Western Europe since 1945, particularly our aid in the reconstruction and development of the Western European economy, also played an important part in the creation of the conditions calling for a Soviet retreat in Eastern Europe; in addition, it seems very probable that American willingness to follow a policy of reciprocal conciliation, as reflected in the 1955 Geneva meeting of heads of states, encouraged the Soviet rulers to believe that a retreat in Eastern Europe would not be accompanied by American intervention or, equally important, expectations of American intervention in behalf of any groups which would be interested in turning the retreat into a rout.

In Hungary the retreat did turn into a rout, and the Soviet leaders acted with utter ruthlessness to prevent that country from going over to the West. The retreat in Poland, on the other hand, was managed by a faction of the Polish Communist Party which the Soviet rulers can apparently rely upon not to go over to the West, and in that situation they acted rationally to make the best of their predicament.

Thus the decisive factors in Soviet policy toward Poland and Hungary have been, first, the political situation in Eastern Europe in the context of the total world situation, and second, the psychology of the Soviet leaders, that is, their willingness to retreat or retrench when that appears to be the lesser of necessary evils, their capacity in some circumstances to act rationally to make the best of a bad situation, their ruthlessness when threatened with serious defeat.

If such an interpretation—here only very roughly indicated—of the sources of recent Soviet conduct in Eastern Europe is correct, and if it is applicable to the sources of Soviet conduct in international affairs generally, then I believe that it follows that the United States Government should modify certain policies to which it has more or less adhered since 1946 and 1947, which are founded on a different interpretation of the sources of Soviet conduct, an interpretation which overemphasizes, in my view, both the role of Marxist-Leninist theory and the role of Russian imperialist ambitions in the determination of Soviet foreign policy.

My answers to the particular questions which you have put, concerning the feasibility of an agreement between the United States and the Soviet Union to limit armaments, follow, I believe, from the general approach which I have outlined.

1. There are many reasons to believe that the Soviet leaders do not attach a high value to a disarmament agreement, speaking generally. However, it is very possible that they will "seriously seek agreement on control of weapons" at a time when their relationship with other Communist countries is appreciably worsening and it appears to them desirable to reduce hopes of American military aid to those countries.

2. Soviet aversion to inspection has been a serious barrier to any agreement to control weapons primarily, in my view, because the Soviet leadership has not attached very great importance to such an agreement. In addition, there has been a deep-seated suspicion that we would exploit information derived from inspection to their disadvantage. Given an international situation which from their point of view is worsening, plus strong indications on our part that we do not intend to exploit the situation to deliver a crushing blow, a disarmament agreement would seem more important to them and their suspicions might well appear less valid.

3. I believe that no Soviet regime in the foreseeable future would be willing to agree to enforcement of a disarmament agreement by an agency in which the Soviet Union did not have at least a veto power. The ultimate sanction against violations of such an agreement would have to be, from the Soviet point of view, reprisals. This follows from the premise that the Soviet leaders see a disarmament agreement not as a means of reducing the likelihood of war in general but rather as a political move which has or does not have advantages for them.

4. In view of the catastrophic defeat of Soviet policy in Hungary, with the consequent repercussions throughout Eastern Europe, and throughout the world, it is likely that the Soviet leaders are now anxious to find a dramatic way of recapturing the initiative and of restoring some of the support which they have lost. If the situation in Hungary could be stabilized in favor of some regime friendly to the Soviet Union, the Soviet leaders would be willing, I think, to withdraw their troops from all Eastern European countries provided American troops are withdrawn from all Western European countries and provided Germany is neutralized.

5. It is a mistake, in my view, to attribute Soviet armaments policy to any pressing economic needs, though undoubtedly the Soviet leadership would like to be able to provide more consumer goods for the Soviet people in order to strengthen the political support of the regime. In this connection it should be noted that the effect of the more liberal policies of the post-Stalin regime has been one thing at home, where the Soviet people seem to have responded in general with gratitude, and another in Eastern Europe, where they have been taken as signs of weakness and the people have responded with demands for more. The failure of the Soviet leaders to anticipate the non-Soviet response is an important clue to recent developments in Eastern Europe, in my opinion.

REPLY OF ZBIGNIEW K. BRZEZINSKI, ASSISTANT PROFESSOR OF GOVERNMENT AND RESEARCH ASSOCIATE OF THE RUSSIAN RESEARCH CENTER, HARVARD UNIVERSITY, JANUARY 4, 1957

1. There have been a number of indications that the Soviet leaders are beginning to appreciate the threat of mutual annihilation through the use of nuclear weapons. Malenkov mentioned such a possibility in one of his speeches and in recent months increased attention has been devoted in the U. S. S. R. to the training of the population for the event of an atomic attack. Some pamphlets dealing with this have been published recently in the U. S. S. R. Although the Soviet leaders have not been too explicit about the possibility of mutual destruction in the event of nuclear warfare, at least one Communist leader outside the U. S. S. R. has made such a statement pointblank, i. e. Gomulka of Poland. These factors suggest that an appreciation of this problem is slowly maturing in the Soviet orbit. However, insofar as an agreement on the control of such weapons is concerned, the U. S. S. R. would probably be willing to sign such an agreement if it were allowed to maintain its superiority in the realm of conventional weapons.

2. Such an agreement would not imply acceptance of the principle of inspection. At the present time, the U. S. S. R. enjoys consider-

able advantage in intelligence opportunities and it is unlikely that it would be willing to diminish them in our favor. Furthermore, the U. S. S. R. has repeatedly gone on record in emphasizing its sovereignty and it is not likely that in the foreseeable future the Soviet Government will drastically revise its attitudes in this respect. A system such as the Soviet has an inherent tendency toward a paranoic fear of foreign subversion, and foreign inspection would be viewed by it as merely another form of espionage.

3. Again, it is unlikely that the present Soviet regime would be willing to accept an enforcement agency if such agency were really given "teeth" in its operations. The U. S. S. R. would probably be willing to accept any arrangement which would either decrease our capacities or increase the opportunities for Soviet inspection of our armaments, without yielding a corresponding privilege to the other side. However, if revolutionary trends in various parts of the globe continue to point to further Soviet expansion, then the U. S. S. R. might be more willing to accept some sort of disarmament in order to prevent an armed reaction from the Western side, when faced with a crisis situation in a number of crucial areas.

4. The Soviet Union might be willing to withdraw from Eastern Europe if (*a*) the area is not turned into a NATO base or a zone of influence for a reunited and rearmed Germany; (*b*) the U. S. S. R. is not given the opportunity to repress through unilateral action efforts on the part of the population or even local governments for greater autonomy. In other words, as long as our policy suggests that Soviet departure will lead to the alternative mentioned in point (*a*) while at the same time the U. S. S. R. is given a free hand to repress any local movements for autonomy then it is unlikely that the U. S. S. R. would consider leaving the area. The reliance of Soviet control in the area on Soviet military strength has recently been amply demonstrated. This reliance, however, is not the same in all the countries concerned. It appears, for instance, that in Czechoslovakia the Communist regime is more able to maintain itself without foreign support than its counterpart was in Hungary.

6. The only effective type of control given the strategic and logistical characteristics of the Soviet military establishment, would be in the form of mobile and unrestricted ground control teams. Such teams would have to have freedom to travel throughout the U. S. S. R. Insofar as legitimate security interests of the U. S. S. R. are concerned, my strong impression (reinforced by a recent trip to the U. S. S. R.) is that a rearmed and reunited Germany poses a genuine psychological factor in Soviet thinking which cannot be disregarded. This element, in fact, applies not only to the U. S. S. R. but to many other European countries, both in Central and Western Europe. It seems that in any disarmament planning, the possibility of a disarmed Germany should be given high priority, especially as the nature of nuclear warfare seriously puts to doubt the military value of a rearmed Germany while the political liability of the policy of rearmament is best reflected in the inability of the parties concerned to make any headway is resolving the German and East European problems.

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REPLY OF DAVID T. CATTELL, DEPARTMENT OF POLITICAL SCIENCE, UNIVERSITY OF CALIFORNIA AT LOS ANGELES, JANUARY 4, 1957

The initial attitude of the Soviet Union toward atomic warfare was determined by Stalin at Potsdam. He remained outwardly indifferent to the report that the United States had dropped an atomic bomb on Hiroshima. This apparent unconcern toward atomic warfare persisted, and the Soviet leaders refused to be moved by the alarm sounded by the West concerning the dangers to the future of mankind. They appeared interested for propaganda purposes, at least, in its curtailment but wanted it to be considered as merely one more weapon to be handled in a general program of disarmament. This disinterested attitude on the part of the U. S. S. R. to the special problem of atomic weapons was, however, feigned indifference because under the surface Soviet agents and scientists were feverishly trying to find out the secrets of atomic energy and build an atomic bomb. Nevertheless, it is possible the Russians only realized the full implications of atomic warfare after they possessed the bombs and began testing them out. Although they exploded their first bomb in 1949, because of the rigidity of foreign relations during Stalin's last years, it was necessary to wait for his death to reformulate policies and take into account Soviet recognition of the peril.

Beginning with a speech of Premier Malenkov in March 1954, the Soviet Union publicly acknowledged the danger of atomic warfare and a new Soviet foreign policy gradually unfolded with the same aims but some new methods. One aspect of this new program was a continuation of the old propaganda line, which still had some popularity, pleading for a ban on the use of atomic weapons but with a new significance because by this time their own stockpile of bombs had become well supplied. In the field of diplomacy the new policy meant the reversal of old patterns. The futility of Stalin's tactics and the fear of a hot atomic war based on the United States policy of mass retaliation led to the realization of the cold war on the West. Thus in the summit Conference at Geneva in 1955 it was one of the Soviet purposes to have both the East and West confirm the calamity of a nuclear war and to end the war of nerves. In place of the cold war the post-Stalin leaders have attempted to choose tactics which would keep away the dreaded atomic holocaust. Primarily the emphasis has been a program of peaceful coexistence, economic grants and technicians for underdeveloped countries, military aid, and diplomatic support for unstable areas. Although Soviet policy has been to promote small conflicts, in all cases the Soviet Union has avoided direct participation. In the case of the Middle East crisis during the fall of 1956 the U. S. S. R. went so far to threaten sending "volunteers" to aid Egypt, but never actually did so. Furthermore, the West was so divided itself over the Suez conflict that there was every reason to assume England and France, in particular, would take every precaution to avoid a large conflagration. It also involved an area not immediately contiguous to the Soviet sphere and therefore it would not have been a strategic threat to the U. S. S. R., if the United States had moved troops in.

Although the Soviet leaders seem to recognize the disaster and futility of an atomic war, they have given no indication at the present time of considering seriously an effective means of control for

atomic and other weapons. Underneath their soft talk and frequent counterproposals their position in opposition to disarmament control is as immovable as was Stalin's. There are several reasons for this. First the U. S. S. R. is still not willing to accept international inspection of her own country or the satellites except on a restricted and superficial basis because she is convinced that the West would use inspection as a means to infiltrate and incite revolt. This danger seems all the more real after the Hungarian uprisings and reports of stirrings within Eastern Europe and even the Soviet Union. The Soviet allegation that American imperialists infiltrated into Hungary and initiated the revolt is not simply propaganda opportunism. From the actions (such as rearming satellite armies) and statements of the Soviet leaders before the outbreak of strikes and revolution, it is clear that the Communists were confident they had a strong grip on the satellites and that among the youth, the workers and part of the scientific and artistic elite the satellite puppet regimes were finding a broader support.

The Soviet leaders counted on relaxing the worst features of Stalin's repression to further solidify the regimes. When the very opposite occurred and the leaders found they had no support in Eastern Europe and only Soviet troops, terror, and war exhaustion had kept the people in hand, they could not admit the complete failure of their policies and doctrine. It would have meant the absolute rejection of Communist ideology. Consequently, it was necessary to rationalize the revolt, not as a doctrinal failure but to concede a tactical failure in not doing more to remedy the economic deprivation of the worker, to accuse Tito of disrupting ideological unity, to condemn Beria and Stalin for their excesses of terror and to put primary blame on the West for conspiring and provoking the rebellion. The proclaimed United States policy of liberating the satellites, the plotting and underground nets formed by sateilite emigré groups which are encouraged and supported by money from the West, and the Communists' own conspiratorial education and practices in attempting to bring down capitalist governments convince the Communist leaders that the popular stirrings and disturbances in their sphere are imperialist plots. Under these circumstances the Soviet Government would be unwilling to permit new "agents" under the guise of a disarmament inspection team to move freely about the country.

Second, like most states, the U. S. S. R. is reluctant to release data on or allow access to military establishments because one well-confirmed principle of warfare is to withhold as much information from the enemy as possible. In the case of the Soviet Union this is even more important because she feels she has succeeded in keeping much of her military structure a secret while the United States has already made public a large part of her military position. Thus in any reciprocal investigation or exposure the Soviets would have the least to gain and the most to lose. In addition if there is any reality in the rumors that the Soviet Army is growing politically stronger, there is even less ground to hope for an adequate inspection system, since military personnel are consistently less willing to expose their armed strength to public view.

Third, the Communists fear that any international control and inspection would be dominated by the non-Communist states. The prac-

tice in all non-Communist international organizations confirms this view. In almost every case the western democracies have dominated these bodies and, when the U. S. S. R. has employed hostile acts or policies, nearly all non-Communist states have tended to "gang up" on her. The overwhelming votes against the Soviet Union on the Hungarian question in the United Nations General Assembly are examples in point. Only the Soviet veto has saved her in the Security Council. Thus, in any control body for disarmament, at the very minimum she would demand a veto and, considering the almost inevitable hostility of the majority in any of the contemplated disarmament authorities, she would probably refuse at the present time to participate in such an organ. In the case of the United Nations, she joined it largely because it would have gone ahead without her and it was easier to prevent it from becoming a hostile coalition and sabotage it from within than from without. The case of disarmament, however, is entirely different because, without the cooperation and active participation of the Soviet Union, and this she well knows, there can be no disarmament control.

Finally, the U. S. S. R. is afraid that with the West dominating the machinery, inspection and control would be effective only against herself and not the West, and, furthermore, all the peaceful benefits which might be a part of the scheme would be monopolized by the capitalists. The western states, they would expect, would manipulate the mechanism in such a way as to restrict and even exploit the economic development of communism for their own benefit. Since this is exactly what the Soviet Union has done in her relations with her satellites, turning them into colonies, it is not surprising that she would expect similar treatment from the West, given the slightest opportunity.

In sum, the Communists are convinced that a disarmament inspection and control system in the present context of international relations could only work against them. They, therefore, feel that their chances of preventing an atomic war are better in creating a stalemate by the stockpiling of atomic weapons.

The next question is whether the Soviet Union at present is disposed to accept a partial solution to the disarmament problem. One possible answer would be to concentrate on conventional armaments, which would bring an end to small brush wars and leave the security of the world dependent on the ability of instant atomic retaliation by the two great powers. There is no concrete evidence, however, that the Soviet Union is ready for even this limited disarmament, in spite of her propaganda pleas to this effect. In fact, the Soviet leaders are less interested in the disarmament of conventional than atomic weapons. Although they are convinced of the futility of an atomic war, small wars conducted with conventional weapons have not been abandoned as instruments of their foreign policy. Extensive Soviet military aid to Egypt and now Syria is evidence of this. They also feel that in conventional weapons they can compete favorably with the West. They already possess an impressive stockpile, and feel that in the long pull, psychologically and economically, their system can sustain arms production better than the West. Militarily prepared for all types of war they can better take advantage of divisions and weaknesses within the free world. Finally, a strong army, conven-

tionally armed, has become necessary to keep the subjected peoples in control. Therefore, the declaration by the Soviet Union that she has cut her armed forces by 2 million troops, even if true, does not indicate a wish for disarmament of conventional weapons and forces under international agreement and control. It means that, for major conflicts, the U. S. S. R. now has her own atomic arsenal for instant retaliation and that, for the brush wars, which she actively contemplates, she does not require an army of 6 million or more. The released personnel can be used more effectively in industry and in agriculture. Furthermore, more emphasis, as in the United States, is being put on military equipment and the skilled personnel necessary to operate it rather than a mass force. Finally, the proclaimed reduction was an attempt to lull the fears of the West and bring about a reciprocal decrease in the NATO forces.

In the present context of international relations, the Soviet Union likewise would be unwilling to withdraw its troops from Eastern Europe. Her intention was made clear by her brutal repression of the Hungarian revolt and the conclusion of new agreements with East Germany and other satellites concerning the right of Soviet troops to remain in the area. Only in the case of Poland did she concede some of her freedom of operations. The grant of several billion dollars' aid to Eastern Europe by the U. S. S. R. in the last few months is further evidence of her desire to stay in the area. And, without the presence of troops, it is clear her hegemony would be lost. After the recent events, even fanatic Communists cannot delude themselves as to the disloyalty of the satellite peoples.

President Eisenhower's "open skies" alternative offers the greatest hope of acceptance by the Soviet Union, because it does not involve close inspection, agents moving freely around the country, or any actual reduction of arms. As mentioned previously, the Soviet Union is not thinking in terms of major wars, not only because it is self-defeating but because she is already accomplishing much through diplomacy, propaganda, economic and military aid, and because she is convinced of the basic weakness of capitalism and the inevitability of world communism. Therefore, as long as the West has the means of retaliation, the Soviet Union is not likely to contemplate a surprise attack which the "open skies" plan is designed to check. Thus, fundamentally, there is some basis for an agreement on aerial inspection between the Soviet bloc and the West; however, important difficulties exist. First, there is the basic inequality of the plan in favor of the West, because the United States would find it difficult under any circumstances to hide mobilization for a surprise attack. Secondly, it would be difficult to make a workable arrangement for the actual execution of the plan. From experiences during World War II in attempting to negotiate Allied use of Soviet airfields, serious obstacles can be expected.

It must be concluded that the Soviet Union is not really in favor of even a modified system of international controlled disarmament. Although she might consent to the "open skies" proposal after long negotiations, this is really not disarmament, and was not intended so by Eisenhower, who considered it merely as a means of reducing some of the tension preparatory to arms limitation. This does not mean, however, the Soviet Union is against all disarmament. Her unilateral reduction of troops is evidence of her desire for partial disarmament on

a voluntary basis by both sides but without international control or agreement. She particularly has no incentive to use international means when her unilateral actions continue to inspire the NATO countries to slow down their armament efforts. The maintenance of a garrison state is no longer her wish, because at present she does not want a major war, and it is quite clear that the Soviet peoples no longer want to bear such a heavy burden but want to share some of the fruits of their labor. But in her policy she does not have in mind anything close to total disarmament. Russia's security, both within and without her sphere, still requires a strong army, professional and well indoctrinated. In concrete terms it will mean at least 3 million men in arms with many more millions in reserve. They will be equipped with the most advanced weapons, and for this purpose the Soviet Union will spend a minimum of 10 percent of her national income for military purposes.

The final problem to be analyzed is the conditions under which the Soviet Union might be willing to accept some kind of international control of armaments or the establishment of a neutral zone in central Europe. One possibility and the most hopeful for an enduring peace would be a basic change in the political structure of the Soviet Union. Any major alteration internally, immediately opens up many new opportunities and the whole problem will need to be reevaluated. Another chance might be offered by the continued development of Western military strength. If the forces of the West began to surpass significantly those of the Soviet bloc and if the Soviet Union internally felt unable to meet the challenge then it would be to her advantage to seek international disarmament. The present unrest in the Soviet sphere denotes a limit beyond which the intellectuals and workers, in particular, refuse to be driven. Another but dangerous method would be for the United States to threaten instant and massive retaliation against the Soviet Union for any small breach of the peace. If the Soviet leaders were convinced the United States meant it, the future might appear uncertain enough for them to consider atomic and long-range missile control. A fourth possibility would be if small nations became capable of building their own stockpiles of nuclear weapons. Although the Soviet Union has reason to trust the sanity of American leaders, they might well fear the atomic weapon in the hands of dictators like Peron, Franco, or Nasser who might use them irresponsibly in a crusade against communism. Finally, if the positions of the East and West became reversed and the Soviet Union was able to dominate the international control body, her attitude toward an international control authority would also change. Except for an internal revolution in the U. S. S. R. none of the above represents a feasible aim or policy for the United States to pursue, consequently the West will also have to be content with stalemate as the main guaranty of peace.

Soviet evacuation of Eastern Europe in the future is a more likely step toward greater world security. The strategic concept of Eastern Europe as a necessary zone of security for the Soviet Union has been in good part outdated by intercontinental missiles and long-range bombers. If the Soviet Union does not contemplate overrunning Western Europe by force, and if central Europe is not used as bases for NATO troops, strategically the area serves little purpose. Neu-

tralization also becomes more a prospect as the cost of Soviet hegemony in the area rises. Until recently these countries have been a source of tribute, but in the last few months Russia has been forced to reverse the flow, spending large sums in Hungary to put down the revolt and granting important economic concessions and aid to the other satellites. If the resistance, particularly passive resistance, grows and the Soviet Union finds the area an increasing burden, she may feel better out of it. In such a case she will certainly bargain for the removal of American troops from Europe and the neutralization of Western Europe or at least Germany. What solution, if any, she might be ready to accept on these issues is impossible to tell and depends on the burden of Eastern Europe and the disposition of the West to make adjustments. A settlement, furthermore, assumes a completely rational approach to the problem by the Soviet leaders and overlooks the psychological importance of a wide barrier between Russia and her old enemy Germany and the inability of the Russian people and leaders to give up peacefully their empire. Nevertheless the evacuation and demilitarization of Eastern Europe in contrast to general disarmament controls is a project which may in time be negotiable. The West, however, must be certain that before a compromise is reached the Soviet Union has felt the maximum burden of satellite resistance.

In conclusion the Soviet leaders do recognize the peril of an atomic holocaust but fear any type of international control and are willing to take their chances on their ability to deliver instant and complete retaliation. They are even less inclined to accept agreement on conventional armaments. Except for the "open skies" proposal there is also little prospect for a partial limitation of arms on an international control basis and even in the case of air inspection a final arrangement will be difficult. A change in the Soviet attitude toward disarmament depends on a radical change of the political composition of the Soviet state, a significant alteration of the world balance of power, or a vigorous and dangerous cold war of threats and armament buildup by the West against communism.

Reply of William Henry Chamberlin, Writer on Soviet Affairs, Editorial Commentator for the Wall Street Journal and Contributing Editor of the New Leader, December 23, 1956

1. I believe the Soviet leaders realize the possibilities of mutual destruction involved in the use of nuclear weapons. I think this is reflected in a growing Soviet tendency to rely on indirect, rather than direct aggression, to pursue their aim of world domination by a series of nibbling moves, no one of which seems serious enough to warrant the risk of nuclear warfare, rather than by a spectacular direct attack calculated to precipitate war.

I do not believe, in the light of the long series of broken treaties and promises in the Soviet record, with its climax in the treachery which marked recent actions in Hungary, that it would be wise or safe to trust our national security, even in limited degree, to any Soviet verbal assurances. The only steps that could be wisely taken in arms limitation would be of the self-enforcing type, where it would be possible to have a constant reliable check on Soviet performance.

2. I do not think the present Soviet Government, a collective dictatorship of Stalin's political heirs, could be relied on to fulfill in good faith any measures of international inspection, even if, for reasons of expediency, it would outwardly accept such measures. A good preview of what would be likely to happen in such a case was furnished by the Korean armistice agreement. The genuinely neutral Swiss and Swedish members of the International Inspection Commission never received satisfactory facilities for inspecting points of entry for munitions in North Korea. As a result there has been a steady buildup of jet planes in North Korea, although these were nonexistent at the time of the armistice, which forbade the introduction of new weapons.

There are two features of the Soviet Union, one geographical, the other political, which make the enforcement of inspection doubtful and difficult. The first is the vast size of the country and the inaccessibility of many areas, especially in Asiatic Russia, to foreign travel. The other is the strict control of expression, so far as the people are concerned, the terror which is still inspired by the political police. This, I think, considerably reduces the likelihood of any disclosures of secret violations of an arms agreement.

I am inclined to stress the point that only self-enforcing measures such as mutual agreement on ground and aerial inspection for a specified distance on each side of the present military frontier would be likely to yield favorable results. So far as I know there is no means of detecting concealed stocks of nuclear weapons and it is difficult to imagine any system of inspection in regard to which the Soviet Government would not have a great advantage in possibilities of evasion.

Only a fundamental change in present Soviet political, economic and social institutions, making for free expression of opinion and some kind of representative government would, in my opinion, make a Russian regime more trustworthy. I doubt whether anyone is in a position to say if, when or how this might come about.

3. For reasons outlined in my reply to (2) I am very skeptical as to the willingness of the present Soviet Government to cooperate sincerely with an enforcement agency. It is my belief, therefore, that only self-enforcing agreements, which do not involve even a small degree of reliance on Soviet good faith, could be advantageous to American interests.

4. The Soviet Government might be willing to withdraw its armed forces from Eastern Europe and from Germany (Soviet troops could hardly be left in Germany if there were a complete withdrawal from Poland) on three conditions: Withdrawal of other foreign troops from Germany, assurance that a united Germany would have a neutral or neutralized status and give up its membership in NATO; assurance that "national Communist" governments of the type of Gomulka's in Poland and not non-Communist or anti-Communist governments should be standard in the east European states.

This poses large and delicate questions for American policymakers.

Negotiation along these lines under present conditions does not seem quite such a hopeless boobytrap as it would have seemed before the death of Stalin and the outbursts of revolt in the Soviet Zone of Germany, in Poland and in Hungary. It can now be assumed that in these countries, and probably in other satellite countries as well, local Communist regimes would have to make big concessions to survive

without the presence or threat of Soviet troops and might well be swept away altogether.

It is my belief that, on any deal involving big military withdrawals on our part, it would not be good enough to settle for national Communist regimes. The danger about accepting such regimes is that they might call in Soviet troops in the future, in the event of a real or alleged political emergency. What we should hold out for, as regards the present satellites, is the status not of Poland today or even of Yugoslavia, an independent Communist dictatorship, but that of Austria and Finland, governments based on free elections but not participating in any western alliances.

5. Soviet manpower shortage, as a result of vast war losses and low birthrate during the war years may have induced the Soviet Government to consider favorably a reduction of the standing army. Because it is totally planned from the top the Soviet economy could perhaps switch more easily from war to peace production than our own. I should greatly doubt, however, that there is sufficient pressure from the people, under the present Soviet setup, to bring about any substantial reduction in military output in order to push up the standard of living. It is the estimate of Dr. Alexander Gerschenkron, of Harvard University, a specialized student of the Soviet economy, that, while industrial output in the Soviet Union has increased about six times since 1928 real wages are still below the 1928 figure, especially as regards food. This shows how people are exploited under communism, largely by military buildup.

6. I greatly doubt that any controls over the Soviet military establishment which the Soviet Government would accept could be safely considered either workable or effective. The problem of establishing such controls is enhanced because a mere checkup of men under arms would be of minor importance. I strongly doubt that it would be possible under any conditions to control effectively such things as hidden stocks of atomic weapons and the progress of research on guided missiles.

JOINT REPLY BY TELEGRAM OF ALEXANDER ECKSTEIN, DEPARTMENT OF ECONOMICS, HARVARD UNIVERSITY; PROF. GEORGE FISCHER, BRANDEIS UNIVERSITY; AND MARSHALL D. SHULMAN, ASSOCIATE DIRECTOR OF THE RUSSIAN RESEARCH CENTER, HARVARD UNIVERSITY, JANUARY 16, 1957

* * * Following paragraph represents our general response to the questions raised: It seems to us that the central problem is that the Soviet Union can scarcely accept the degree of penetration required for a thoroughgoing inspection and enforcement without a fundamental change in the character of the system having taken place. We also recognize that technological developments may change the problems of inspection and enforcement so that these objectives can be achieved with a less complete penetration of the countries involved and we therefore urge that thinking in this direction be continued and augmented. In response to your question four, we believe that a distinction needs to be made between the disarmament question and the question of the possible neutralization of Eastern and/or Central Europe. Even if it were possible to obtain a withdrawal of forces under some such agreement the problem of disarmament,

especially with regard to weapons of mass destruction, would remain. In general it is our conclusion that disarmament must on the whole follow rather than precede a lessening of international tensions. By this we mean not merely changes in atmosphere, but a series of settlements of outstanding problems which would make an appreciable dent in the underlying causes of tension.

REPLY OF HAROLD H. FISHER, CHAIRMAN, EMERITUS, HOOVER INSTITUTE AND LIBRARY ON WAR, REVOLUTION, AND PEACE, STANFORD UNIVERSITY, AND PROFESSOR OF INTERNATIONAL RELATIONS AT SAN FRANCISO STATE COLLEGE, FEBRUARY 16, 1957

1. I believe that the leaders of the Soviet Union recognize the threat of mutual destruction in the new weapons. The "softer" policy advertised by Khrushchev and Bulganin was inspired in part, in my opinion, by a recognition that the destructiveness of the new weapons makes it even more impossible than ever to "win" a total war. Events in Hungary and Poland have undoubtedly shaken the sense of security of the Soviet leaders and revived the tension between the Communist regimes and the West but I do not believe that these events will obliterate the realization of the dangers of atomic war. The Soviet leaders apparently already recognize the mutuality of interest in preventing nuclear war but they are likely to be even less conciliatory now than they were before the Hungarian uprising in negotiating an agreement for the control of these weapons.

2. I believe that inspection in the Soviet Union is a possibility but that it will have to be developed gradually, piece by piece, and not in one overall agreement. It will take a long time. The rate of progress toward an inspection agreement depends on the state of world tension. As tension goes up the possibility of an inspection agreement goes down. The United States, by itself, cannot control the state of tension. The Soviet oligarchy has, in the past, on many occasions, deliberately increased international tension. But the United States can adopt policies that would permit the relaxation of tension if the Communists would actually follow a policy of peaceful coexistence and competition. If the United States bases its policies on the inevitability of war with the Soviet Union or on the necessity of liberating some or all of the countries now held captive by the Communists, the Soviet leaders are not likely, in my opinion, to agree to inspection.

3. It will take a long time before national governments in general and the Soviet Government in particular will be willing to submit to international enforcement agencies, especially those that deal with matters affecting national security. I suspect that regardless of how far apart they may be on other matters, the Soviet leaders and some of the members of your subcommittee might have very similar views on international enforcement agencies.

4. One condition for the withdrawal of Soviet troops from Eastern Europe would be the neutralization of Germany. Another would be the one mentioned in your questions—the removal of foreign troops and bases in NATO countries.

The recent events (autumn 1956) in Poland and Hungary and the failure to reestablish cordial relations with the Yugoslav Government will not be likely to encourage a liberalization of the Communist

regimes in East Germany, Rumania, Czechoslovakia, Bulgaria, and Albania, but in the long run the influences that inspired the revolts against Russian-Communist domination, first in East Germany and then in Poland and Hungary may bring about a liberalization of the regimes in these countries and possibly in Rumania, Czechoslovakia, and Bulgaria.

The presence or the proximity of Soviet troops is very important, I believe, in maintaining Soviet domination in East Germany, Poland, Czechoslovakia, and Hungary. It may be less important in Rumania and Bulgaria and much less in Albania.

The Soviet Communists can be expected to do everything they can to discourage national communism and to keep subservient Communists in power in Eastern Europe. A marked reduction in Soviet forces and their withdrawal from these countries would make Moscow's task much harder. An American policy that refuses all aid and comfort to such national Communists as Tito, Gomulka, Nagy will obviously aid the Kremlin by discouraging resistance to Russian domination.

If the Soviet Communists agree to a neutral zone, they will not be easily persuaded to include any satellite territory in it unless, perhaps, Eastern Germany. In answers to the questions of the British Labour M. P.'s, Pravda recently said that neutrality was impossible for the members of the Warsaw pact so long as the "aggressive" NATO existed.

5. I believe that the Soviet Union would welcome relief from the present burden of armament for several reasons: (*a*) to be able to use more of the national product to raise the levels of living in the Communist-ruled countries; (*b*) to enable the Soviet bloc to give more effective and technical assistance to economically underdeveloped countries in Asia, Africa, and Latin America; (*c*) to gain prestige and goodwill for communism by representing the Communists as the leaders in making swords into plowshares; (*d*) to create difficulties for the capitalist regimes, which according to Communist belief, cannot escape economic depressions or avoid intensifying competitions among themselves for markets and raw materials. To the best of my knowledge the present ruling circle in the U. S. S. R. has not repudiated Stalin's assertion a few months before his death that there was more likelihood of war between capitalist nations than between the capitalist nations and the Soviet Union. I believe that Soviet policies regarding disarmament and other international matters are based on the Communist dogma that the capitalist countries, because of the very nature of capitalism, cannot solve their economic problems and in their desperation will carry their competition with each other to the point of mutual destruction.

It would seem reasonable to believe that the economy of the U. S. S. R. would benefit by the transfer of men from the military force to the labor force.

I should not think it would be any easier for the U. S. S. R. to adjust to an appreciable reduction in armament production than for the United States. The vast Soviet bureaucracy would not insure a smooth and swift adjustment.

6. The type of controls most likely to be workable and effective would be: (*a*) Those designed to make a surprise attack with intercontinental missiles impossible; (*b*) a step-by-step reduction of forces

under arms; (*c*) the establishment of a supervisory body under the U. N. in which countries are represented that are incapable of aggression and are greatly concerned to be relieved of the danger of war; for example, Sweden, Finland, Burma, Indonesia, Netherlands, Ceylon, Greece, Uruguay, New Zealand, Poland, Rumania, Austria, perhaps under the chairmanship of a nonmember, Switzerland.

The Communist view of "legitimate security interests" is likely to be very different from ours. I do not see much possibility of reconciling these different views until international tension has been diminished and confidence in peaceful procedures has been built up. This will be very difficult to do. It may be, as some contend, that the Communists will never allow this détente to take place. But it seems to me that if we wish to achieve the benefits of peace and avoid the awful consequences of war we must base our policies on the belief that it is impossible to maintain peace and avoid war. This would seem to mean that in spite of the provocation and difficulties involved, we must work with patience and fortitude for a system of international relations based on a real acceptance of peaceful coexistence and competition between different political and social systems. Those who believe in freedom and human dignity should have no doubts about the outcome of that competition.

Reply of Ralph T. Fisher, Jr., Assistant Professor of History, Yale University, February 3, 1957

I know that your subcommittee has had access to the views of persons far more expert in this matter than I. I answer, therefore, not so much out of a conviction that I can add anything of value as out of a desire to express my gratitude for your invitation, and I shall merely state my viewpoint in very general terms.

My attitude is, I regret to say, rather pessimistic. I see little likelihood that in the foreseeable future the Soviet leaders will seriously seek agreement on control of weapons. I doubt that the Soviet leaders will soon permit the sort of inspection or enforcement that such an agreement would entail.

At the same time I believe that dark picture must never cause us to surrender all hope. We must continue, as your subcommittee is doing, to examine every conceivable solution. We must remain militarily strong (stronger in ground forces than we are at present, I think), yet we must endeavor constantly and in all ways to convince the Soviet leaders that we sincerely desire peace and are ready to discuss behind closed doors any proposals they may make in good faith. We must do all we can, swallowing our pride, suppressing our annoyance, and suffering, perhaps, frequent embarrassment, to maintain contact between individuals across the Iron Curtain. And we must through education prepare our own countrymen for the day when, in the interests of survival on this globe, we may need to surrender some of our own cherished sovereignty.

Reply of Prof. Calvin B. Hoover, Duke University, December 12, 1956

1. I believe the leaders of the Soviet Union recognize the threat of annihilation created by nuclear weapons. Consequently, this threat has entered into the formulation of policy and recent actions of the

Soviet Union. It was probably our temporary monopoly of nuclear weapons which prevented the Soviet Union from occupying Western Europe.

However, there is a distinct difference between the psychological set of mind of the Soviet leaders and that of the leaders of the United States and of western countries on this matter. Men like Khrushchev, Bulganin, Molotov, and Malenkov have been conditioned to witnessing masses of men liquidated and to the realization that they were personnally responsible for this destruction in detail and in gross. Consequently, while the prospect of the destruction of themselves and of their empire is, indeed, a most serious deterrent, any feeling of humanitarian horror for what would happen to mankind in general or even to the Russian people as a whole is not a major factor in their calculations and feelings. In a sense this might not seem to make much difference since what happens to the Russian people would naturally be of most serious importance to the leaders also. Nevertheless, psychologically the distinction is extremely important.

In spite of the reservation mentioned in the above paragraph, I believe the Soviet leaders recognize some mutuality of interest in preventing nuclear war and that they would seek agreement on control of weapons. This is true in considerable degree because if weapons were controlled they would probably believe that the possibility of intervention in foreign countries for the purposes of Soviet expansion might even be facilitated by such an agreement. It would not necessarily follow that this would be so, but I think the Soviet leaders might reason this way.

2. It is unlikely that the Soviet leaders would be willing to accept more than limited ground inspection at transportation and communication centers in the Soviet Union and air inspection of Eastern Europe. The unwillingness of the Soviet leaders to accept a greater degree of inspection is due not only to military considerations but to their unwillingness to open up the Soviet Union to continuous observation of nonmilitary aspects of the country as well and to their reluctance to permit contact between the Soviet population and inspectors continuously stationed in the Soviet Union.

(In view of the hatred of the Soviet Union which exists in the satellite countries of Eastern Europe, if it were possible to work out some kind of mutual withdrawal of American troops from Western Europe and Soviet troops from the satellite countries even the limited degree of inspection referred to above might be worth our agreeing to. In view also of the declining importance of our land forces in Europe under present circumstances and in view of the logistics problems which the Soviet forces would encounter in moving large land forces through the hostile populations of the former satellite countries, an agreed upon withdrawal of forces might well be in our interest. It is, of course, impossible in this brief space to point out all of the complicated aspects of these matters.)

3. The present regime in the Soviet Union would be willing to submit to and abide by such an enforcement agency only to the extent to which they found it necessary and/or advisable. It is indeed doubtful whether the Soviet Union would be willing to agree to an enforcement agency which would in fact have power to carry out enforcement. We would have to be prepared to denounce such an agree-

ment whenever it was violated by the Soviet Union. This would have to be the real sanction.

4. Question 4 has been partially answered in the second paragraph of my answer to question 2.

The Soviet Union might be willing to withdraw its troops from Eastern Europe if the United States were willing to withdraw its troops from Western Europe. On the one hand, recent events in Hungary and Poland might make Soviet leaders less willing to withdraw their troops. They must now realize the extreme unpopularity of Soviet dominated regimes in these countries and realize that Soviet domination would not survive troop withdrawal. On the other hand the Soviet leaders might now in desperation be willing to jettison their whole satellite position in Eastern Europe on its present basis before they are confronted with a series of major uprisings in all the satellite countries.

It is now apparent that the domination of the Soviet Union over the countries of Eastern Europe is almost wholly dependent on the presence of Soviet armed forces within and near the borders of these nations. Mere reduction of the size of Soviet forces in these areas would be of little importance since in the event of trouble such forces could be reinforced rather quickly. It would be quite a different matter if the Soviet forces had been completely withdrawn. In this case, bases would not be available immediately to them in these countries, the national governments of these countries would have been able to have built up military forces of some degree of reliability who could be depended upon to cause great difficulties to the Soviet forces in their reoccupation of these countries in case of a land invasion of Western Europe.

5. I believe it is true that the leaders of the Soviet Union would be glad to be able to reduce military expenditures. The living standards of the Soviet Union and the satellite countries are very low. Particularly in the satellite countries, there is apparently the most active dissatisfaction with this low standard of living. This dissatisfaction is not so apparent in the Soviet Union itself, since living standards have improved since the end of World War II. Nevertheless, the pressure for improved standards of living particularly in food and in housing is very great. The announced Soviet troop reduction can be partially attributed to this cause.

The nature of the Soviet economy is such that the adjustment required by an appreciable reduction in the production of armaments could be carried out with little difficulty. Consequently there are no purely economic difficulties which would discourage transition from greater to less armament production.

6. I doubt whether my comments on No. 6 would be particularly valuable.

ALEX INKELES, LECTURER ON SOCIOLOGY AND SENIOR FELLOW OF THE RUSSIAN RESEARCH CENTER, HARVARD UNIVERSITY, DECEMBER 21, 1956

1. I believe that there have always been grounds for assuming that the leaders of the Soviet Union recognize the advantages of preventing nuclear war, but are in no sense motivated even at the present time by the idea of mutuality of interest. The very concept of mutuality

is alien to them. Since in this case, however, they can only secure their objective by joining us in a program I think the prospects are very substantial. What we must be prepared for, however, is that they will take every possible measure to see to it that the arrangements entered into are in fact nonmutual, that is, restrict us in a way that increases their security without in fact restricting them to a comparable degree. Nevertheless the general advantage which will likely occur to them from the other steps they can take once this issue is brought under control is so great that they are likely to go to surprising degrees to work out and accept a program that meets our requirements.

2. I believe that my comments in answer to the first question cover the answers to inspection raised here. Real inspection is a very threatening idea to them, but they may go along even on this point if it is the ultimate obstacle to secure an international agreement with regard to the nuclear issue.

3. Again I believe my responses to 1 and 2 cover this point.

4. I do not feel I have any special competence with regard to these issues.

5. Without question the Soviet regime would like to be relieved of some of its military burden as would any leadership if it could accomplish its objectives at less cost. The one thing we should be clear about is that Soviet long-run objectives have not profoundly changed. They still look forward to and regard it as one of their prime responsibilities to move the world as rapidly as possible toward communism. Their assessment of the present period, however, is that the greatest opportunities for such development lie through an exploitation of nationalist feeling and economic strains in the former colonial areas. Greater investment in these directions obviously will be possible if the military burden which was earlier endured because of the focus of armed action in Europe could now be reduced. In particular the Soviet Union is desperately in need of labor and especially the kind of quality labor that is often found in the army. Here again, however, reduction in size of the domestic military forces should not be misunderstood with regard to the ultimate motivation lying behind it.

6. The basic problem with regard to the Soviet military forces is not that of assuring them of their ultimate security under any circumstances; but of assuring them of their security under the unique political objectives of the Soviet system at large. Only a change in those objectives would enable one to significantly reformulate the problem. If it became clear that the hopes for the spread of world communism had become greatly tempered, then I do not seriously believe that it would be unusually difficult for us to take action which would persuade the Soviet military that they were indeed in a highly defensible position. It is of course possible that Soviet military leaders realize that it is Soviet foreign policy objectives that make it so difficult for them to attain a position of real armed security. If so, we ought to make the most of this in our communications directed to the Soviet elite. If, however, the Soviet military share the aspirations of the political leaders, then I frankly do not know of any measures we can take which would convince them of their security, nor indeed do I believe it would be wise to do so. So long as their policy remains expansionist, I think it is to our interest to keep them persuaded that we mean business.

REPLY OF PROF. STEPHEN D. KERTESZ, COMMITTEE ON INTERNATIONAL RELATIONS, UNIVERSITY OF NOTRE DAME, JANUARY 11, 1957

1. We may assume that at the present moment all major powers are aware of the impracticality of an all-out nuclear war as a means of settling international disputes. Leaders of the Soviet Union have recognized the possibility of mutual annihilation through the large-scale use of thermonuclear and other new weapons. This fact has influenced the formulation of their foreign policy. They probably do not believe that a nuclear war could be useful or even necessary for the achievement of Communist objectives. For these reasons Soviet policy is not seeking but apparently is trying to avoid a nuclear war. Today, events sliding out of control are more likely to be the cause of a general war than a planned aggression.

Although we may accept these assumptions, it does not follow that the leaders of the Soviet Union would refrain from creating situations leading to war or would have the intention of seeking an honest and mutually beneficial agreement with western states on control of weapons. It is difficult to make a judgment on the seriousness of Soviet intentions with regard to an agreement without considering briefly the general behavior of Soviet leaders toward the non-Soviet world.

The fact that Foreign Minister Molotov took a gun with him and put it under his pillow while he was a guest in the White House or in Winston Churchill's country home, is characteristic of the Soviet leaders' mental outlook. Ever since Lenin defeated the revolutionary government with its western ideas, and turned Russia deliberately and resolutely against the West, Soviet leaders have been prisoners of their own doctrines and practices and cannot be judged or categorized by normal western standards. Their mental picture of the world has not been less unbalanced than that of some who are living in an asylum or are accustomed to the ways of the underworld. The unattractive fate of so many Soviet leaders exposed the inherent characteristic of Soviet totalitarian dictatorship. Although these conditions are a misfortune not only to the Russian people but to all mankind, we have to take them into account.

In this sorry picture I would like to emphasize a basic factor which we should keep in mind in the course of all negotiations and agreements to be concluded with the Soviet Union. This is the necessarily ambivalent attitude of Communist leaders in all their dealings with non-Communist states. This psychological attitude is one of the consequences of some fundamental doctrines of Marx, Lenin, and Stalin which create an almost unavoidable duplicity in Communist thinking in its relations with non-Communist states.

After Hitler's seizure of power, the Soviet Government decided to make common cause with the western democracies. During this period the Kremlin was forced to assume that the western democracies, obviously on the defensive, were genuinely interested in combining forces in order to restrain or if necessary defeat Hitler. At the same time Soviet revolutionary dogmatism compelled them to believe that somehow the capitalist countries were conspiring together against the Soviet Union. The same ambivalent Soviet attitude prevailed during the Second World War in regard to the capitalist countries, particularly the United States and Great Britain. We do not have

reason to believe that this basic Soviet attitude toward the non-Soviet world has changed.

Although the Soviet Government has proposed cuts in armed forces and has showed willingness to conclude a limited agreement on the control of weapons, the coexistence of two different and mutually contradictory sets of assumptions in Soviet political thinking make the seriousness of their peaceful intention doubtful. After experiences during the past four decades with the methods of Soviet diplomacy, it would be folly to rely on Soviet promises.

The present leaders of the Soviet Union are typical products of the Russian Communist world. They are even less influenced by western thinking than their predecessors, and the hostility toward the non-Soviet world has not changed in Soviet leadership. Changes in their attitude have occurred so far only on the tactical level. Thus the greatest possible mistake would be to negotiate with Soviet representatives according to western ways and attribute much significance to their promises. Numerous disappointments in the past originated from the fact that American negotiators handled Soviet representatives according to western standards. Since Soviet-American relations produced an almost unbroken record of broken pledges, American diplomacy had to learn the hard way that possible reactions of Soviet leaders to future contingencies cannot be judged on the basis of normal western expectations.[1]

2. Without fundamental and officially stated changes in Soviet political doctrines and practices, there is little if any likelihood of reaching an agreement opening the Soviet Union to effective inspection. It is true that since Stalin's death many important changes have taken place in the Soviet Union, but these changes have occurred only on the tactical level and have certainly not yet reached the point of no return. For a variety of reasons Soviet leadership might again introduce some kind of harsh Stalinist system. But in the long run, important factors inherent in human nature are working against putting an end to the liberalizing tendencies. This is particularly conspicuous in the attitude of the university students in the Soviet Union and other Communist-dominated countries. Mainly because of the attitude of the youth, concessions by the Kremlin may release forces of great significance, and changes made for the tactical reasons may escape from the control of the Communist operators.

Since I do not exclude the possibility of serious transformations in the Soviet Union which would lead eventually to a changed attitude toward the West, I consider as a possibly promising sign the acceptance by the Soviet Union of an aerial inspection for Eastern Europe and limited ground inspection at transportation and communication centers in the Soviet Union, and possibly even with withdrawal of the Russian Army from east-central Europe. The real problem in such an agreement is the quid pro quo involved.

What is the price the Russians are asking for moving out of east-central Europe and what is the price we reasonably can pay? We must have realistic answers to these questions before making any commitments. While the Red army would be stationed along the frontiers

[1] See for details the enclosed study entitled "Reflections on Soviet and American Diplomacy," by Stephen D. Kertesz. Review of Politics, vol. 19 (1957), pp. 3–36. (The study referred to is on file with the subcommittee.)

of the evacuated states and thus within easy striking distance of the heart of Europe, the American Army would retreat 3,000 miles and would be separated from Europe by the Atlantic Ocean. Moreover, a limited ground inspection system in the Soviet Union might be meaningless in view of the vastness of the land. Only an ironclad system of general inspection would mean assurance against Russia's capacity for a surprise attack. Such a system should include aerial inspection as well as ground control posts in sufficient number. The West cannot allow the deterioration of its strategic position, with possible adverse political consequences, in return for marginal Soviet concessions in disarmament within the framework of an inconclusive settlement.

Basic transformations in Soviet leadership will not take place overnight. The dream of a sincerely cooperating Soviet Union belongs to the distant future. Until that time, Soviet leaders will not be impressed by arguments unsupported by overwhelming force. Thus in the foreseeable future the strength and unity of the Western World will be the most effective deterrent to Soviet expansion, and these may be the only inducements to conciliatory attitudes in the field of disarmament on the part of the Russians. For the time being, however contradictory it may seem, further building up of western strength seems to be the only realistic step toward a general disarmament. We must rely on strength to buy time in the expectation of better developments in the countries living under Communist domination. A strong and united West might have an influence on Soviet leadership and eventually might crystallize prowestern forces willing to settle realistically the outstanding political issues, including disarmament, which exist between Russia and the Western World.

3. It is not likely that the present regime in the Soviet Union or any Soviet regime in the forseeable future would be willing to submit itself to an effective enforcement agency destined to deal with violations of the disarmament agreement.

4. The creation in central Europe of some kind of neutral zone in which the strength of armed forces would be fixed by agreement is probably the most realistic part of the disarmament proposal under discussion. This means at least implicit recognition of the idea that armaments are symptoms and not causes of international tension. Sources of trouble are not the actual or potential armaments but the many unsettled political questions in the heart of Europe. Without their solution, disarmament alone would be meaningless, if not positively harmful. First of all the political climate should be improved through settlement of outstanding issues. Reduction of tension between the Soviet and non-Soviet worlds would be necessary as a first step. Withdrawal of American and British armies from Europe before solution of the underlying political problems would only create new volcanoes. A new system of security for the whole of Europe could be combined with disarmament but disarmament alone would not do the trick.

No disarmament is possible without a minimum degree of mutual trust. The real roadblock on the way to disarmament is the mutual lack of confidence. The Washington Conference in 1921–22 was successful in establishing qualitative disarmament among the five major naval powers in a limited field because it established a political equilibrium in the Far East simultaneously with the agreement on dis-

armament. In the same way, disarmament in central and Eastern Europe would be a relatively easy problem if mutually satisfactory solutions could be worked out for such problems as the enjoyment of human rights and fundamental freedoms, civil liberties and free elections, the unification of Germany and an agreed boundary settlement between Poland and Germany, and settlement of the problem of the German expellees. In this process disarmament cannot be the first step but rather a byproduct of political solutions.

At this critical juncture of world affairs the cause of peace and disarmament would be best served if the United States would put forward bold and imaginative concrete plans for the settlement of the most troublesome international problems. At an appropriate moment, the President of the United States could propose the convocation of a world conference, perhaps within the framework of the United Nations, for the solution of some fundamental issues which block peaceful cooperation between nations. If leaders of the Soviet Union are unwilling to participate or would sabotage constructive arrangements that would reduce world tension, at least the bluff of their phony peace offensive would be called and the uncommitted peoples would see the real obstacle to a better future for mankind. Soviet duplicity would be made clear once more through confrontation of Soviet policies with worldwide aspirations.

As to the presence of the Soviet Army in east central Europe, it is generally recognized that Communist regimes in this area could not survive without the actual or potential threat of the Red Army. After a Soviet evacuation, there would be a good chance for a really democratic evolution. But economically most of the states in east central Europe would probably continue to cooperate with Russia. As a result of Communist directed planned economy, the traditional relations between the highly industrialized western Europe and the predominantly agricultural eastern part of the continent have been considerably disrupted. Since the captive countries were cut off from the West, the orientation of their trade changed and the Soviet Union acquired a monopolistic position in the area in more than one way. Heavy industry in the satellite states was made increasingly dependent on deliveries of Soviet industrial raw materials for which the Soviet Union has received manufactured goods. The fact that Moscow was in a position to determine the prices for many finished products and raw materials in export and import relations amounted to an additional control over the economic growth and living standard of the captive peoples.

As a result of all these developments, economic relations between an industrialized eastern Europe and the western part of the continent would greatly differ from the ones which existed before the Second World War if by a miracle Soviet Russian control should disappear overnight. A free economic cooperation between the east central European states or possibly between an east central European federation and Russia could be mutually beneficial. The elimination of political oppression and economic exploitation could be the basis of friendly relations between them.

Soviet Russian influence in the area thus could be similar to United States influence in Mexico or Canada. Unfortunately, there is little likelihood of such a development because Russian policy in general and Soviet Communist policy in particular is unable to cooperate on

the basis of equality. Soviet leaders hate and distrust the western states. This is a major obstacle to all reasonable settlement. The picture of the world in their mind is distorted by outdated Marxist theories and by the ruthless practices of a police state. According to well established Soviet views, no free people are reliable. In Communist usage "cooperation" means oppression and exploitation and "friendly government" means Communist dominated government. Communist fear of freedom is a psychopathic mental block in their thinking. This constitutes the greatest impediment to the creation of a truly neutral belt in Europe. Negotiations on disarmament could not eliminate this obstacle.

5. Secretary of State Dulles in his testimony of February 29, 1956, before the Subcommittee on Disarmament, referred to a few probable motives of the recent Soviet disarmament proposal. He suggested that "the Soviet Union would like to be relieved of some of its military expenditure, so it could devote more of its economic productivity to raising the living standards of its own people and the satellite peoples and perhaps to have more money to spend on its foreign aid." These motives certainly exist, but the background and implications of the Soviet disarmament proposal are more complex.

Probably it is safe to admit that the Soviet Union, like most countries would welcome relief from the present burden of armament. But at the same time we should note that disarmament proposals have been traditionally used in Russian foreign policy for a variety of purposes. In 1816 Alexander I proposed to the British Government the simultaneous reduction of armaments of every kind and Nicholas II proposed the convocation of the first Hague Peace Conference of 1899 mainly for the limitation of armaments. The Soviet Government diligently participated in the disarmament efforts of the League of Nations and advocated drastic measures for disarmament. For example, a Soviet declaration of November 30, 1927, proposed "the complete abolition of all land, naval and air forces." Such proposals were in harmony with Russian power political interests of the time and made clear the fact that Russian diplomacy was using disarmament proposals mainly as diversionary moves in order to improve Russia's international position. This is as true today as it was in the past.

The announced Soviet troop reduction of 1,800,000 men, if true, can be attributed not only to economic reasons but perhaps primarily to the gradual introduction of atomic weapons in the Soviet Army. Since the cost and manpower saving character of nuclear weapons are probably as valid in the Soviet Union as in the United States, production of tactical atomic weapons may bring relief to Soviet economy with a simultaneous increase of the firepower of the Soviet Army. Reduction in manpower is not equivalent to disarmament in the contemporary world. If associated with reorganization of an army it may even increase the nation's military potential. Great caution should be observed in the atomic age in attempting to measure disarmament by the conventional military yardsticks.

We should also note at this point that a census of arms and armed forces could be the only realistic point of departure in a general disarmament scheme. The disarmament plan proposed by the Western Allies in November 1951 rightly considered a continuing inventory

of all armed forces and armaments combined with international inspection as the core of any solution to the problem. Moreover, reductions in themselves are not meaningful as long as great disproportion exists in the number of Soviet and non-Soviet combat-ready divisions in Europe. Leaders of the Soviet Union even boasted recently of their military superiority over Western Europe and used it as a threat. Since the Soviet Union did not carry out a full demobilization after World War II, and continued to develop its armaments ever since, it would not be reasonable to accept an unbalanced situation as a basis for future disarmament.

We may assume that a reduction of Soviet armed forces would make possible some more foreign aid and the increased production of consumer goods in the Soviet Union and in the captive countries. But there are fundamental differences between the possibilities open to a democratic and a totalitarian government in the economic sphere. Soviet industrial progress is prodigious in many important fields. Moreover, the possibility of diverting raw material and other goods from civilian consumption to military uses is almost limitless in a totalitarian dictatorship. Although the production of steel in the Soviet Union is still considerably less than in the United States, in absolute figures probably more steel has been used for armaments in the Soviet Union than in the United States. It is pleasant to have many cars, television sets, and refrigerators, but these gadgets do not increase the military strength of America.

While in the Soviet Union even a slight improvement of the living standard is greatly advertised and appreciated by the people, the danger exists that the American society, amidst the legitimate enjoyment of the highest living standard on the globe, may under a given set of circumstances refuse sacrifices involving a temporary lowering of the living standard. Such attitude significantly weakened the French and British power position in the crucial years preceding the Second World War. A similar disposition in the society was the overture to doom of several empires in the past. I, for one, believe that this will not be the case in the United States. No sacrifices are too great for freedom. But it is a more difficult and usually time-consuming task to persuade societies with representative forms of government of the necessity of sacrifices than to impose restrictions from above in a totalitarian country. The great flexibility of democracies may not have an opportunity to prevail over dictatorships after the devastation of a nuclear war.

If we compare the number and fire power of the combat-ready divisions and the armaments of the Soviet and non-Soviet worlds at the end of the Second World War and today, it is impossible not to feel some uneasiness. Although numerous blunders of Soviet diplomacy prompted the creation of NATO and other security arrangements of the West, still a disturbing feature remains in the picture of western inclination to give preference to an easy life over security, and its consequent military weakness. One of the worst political effects of the Suez crisis was the fact that it exposed the suspected military weakness of France and England.

The Soviet Government undoubtedly has greater freedom for maneuvering in regard to the question of increasing the production of weapons or consumption of goods or using them as means in diplo-

macy. This freedom is particularly characteristic in the field of foreign aid. Although Soviet foreign aid is insignificant compared to United States foreign aid, gifts, loans, and investments abroad, it is used with great flexibility in such strategic areas as Afghanistan or the Middle East. The cases of Iceland and India are other examples of how Soviet economic activity outside the Communist orbit was shrewdly calculated and timed in order to bring the maximum political benefit to the Soviet Union for relatively small investments.

6. It is a sound view expressed by the United States Government that only a thorough-going system of inspection under the direction of an international agency could be effective and workable over Soviet military establishments. Mutual guaranties and an international agency could satisfy the legitimate security interests of the Soviet Union as well as those of other states. On disarmament planning the great territorial extent of the Soviet Union should be taken into consideration. This creates a special security interest which would justify the maintenance of a proportionately large army. We may add that the word "legitimate" often means something entirely different to the Soviet leaders than it does in the West.

REPLY OF PROF. CLYDE KLUCKHOHN, FORMER DIRECTOR OF THE RUSSIAN RESEARCH CENTER, HARVARD UNIVERSITY, JANUARY 14, 1957

1. There are grounds for believing that the leaders of the Soviet Union recognize the threat of mutual annihilation created by nuclear weapons. So long as this threat exists, I believe that Soviet foreign policy will be cautious when they are convinced that the alternative is nuclear war. I do not, however, think that they will seriously seek agreement on control of weapons except for "tactical" purposes. Such purposes would include one or both of the following objectives:

(*a*) Psychological warfare; i. e., they could be placed in a position where failure to seek, or accept, such control would be seriously damaging vis-a-vis their relations with "neutral" nations or internally (including the satellites).

(*b*) A conviction that it would be to their interest to keep the peace because economic collapse in the West was imminent and they could therefore win the struggle more cheaply and without danger of destruction of their own industry, etc.

I can conceive of two circumstances under which they might simply have no interest in preventing nuclear war: (1) An internal crisis which the ruling leadership felt could be resolved without loss of their power only through war; (2) if they were to gain decisive superiority in intercontinental missiles.

2. So far as the present leadership is concerned, the attitude toward inspection will, again, be purely "tactical." I think it is quite possible that they might accept a certain degree of inspection provided they felt they had something to gain from it (e. g., psychological warfare aims and/or a throwing the West off its guard). I cannot overemphasize my conviction that the long-term aim of the present leadership is unchanged and unchangeable: Communist control or, at very least, unquestioned preeminence in the world. This will alter, as Khrushchev said in speaking to the East German delegation in Moscow in September 1955, only "when shrimps in the sea learn to whis-

tle." To be sure, many gambits are possible within the limits of this game. One is inspection. The Soviet rulers are determined to split NATO and to weaken the economy of the West. There are many indications that Soviet leaders are convinced that our economy would go into serious difficulties once we ceased spending such large sums for military preparedness. If they believe that inspection is likely to cause the people of the United States and the democracies of Western Europe to become divided among themselves and to cut military budgets, inspection would be worth a considerable price to the U. S. S. R.

As to the more distant future, there are, of course, so many unforeseeable variables that one can do no more than point to certain probable and relevant trends. Assuming that we do not permit further major expansion or aggression on the part of the Soviet Union and assuming that we do not allow them to surpass us decisively in airpower, nuclear weapons, or intercontinental missiles, I firmly believe that it is in the best interests of the United States to keep the peace. For, as Mr. Justice Holmes remarked: "Time wears away many fighting faiths." I do not believe that the ruling elite in the U. S. S. R. (China is another story) can continue for another 15 or 20 years to keep its people terrified of "capitalist aggression" (nor in general so badly and incorrectly informed as to the outside world), let alone committed to a messianic imperialism of world communism. Already there is trustworthy evidence on two points:

(*a*) The new bureaucratic and managerial "middle class" has enough stake in the status quo to exhibit little enthusiasm for risky adventures.

(*b*) The younger generation (particularly the students) shows enough dissatisfaction with present conditions in the U. S. S. R. to give even a dictatorial leadership pause.

4. I do not think the present leadership will ever relinquish its control of Eastern Europe (and this means withdrawal of troops) except under circumstances where they were sure that the West no longer represented an effective challenge (economic collapse, complete disunity of the West, extreme leftist governments in control of all or most of the continent—plus, probably, Britain). The proof of this statement seems to me to lie in the Hungarian episode. A majority of the present Presidium had apparently agreed to go a considerable distance in the case of Poland. But Hungary was too much and not least, I suspect, for the top Soviet military. There are tantalizing fragments of evidence that suggest Zhukov and others were prominent in demanding that Hungary be crushed because a genuinely "neutral" nation in the geographical position of Hungary was conceived to be an intolerable danger to the security of the U. S. S. R.

Once more, it is not inconceivable that within 10 or 15 years—possibly even less—there could be enough change in the internal power structure within the U. S. S. R. so that a truly neutral zone could be created in central Europe. I think this is most unlikely in the immediately foreseeable future—and this includes Eastern Germany. As I think the present leaders (and possible leaders of the immediate future) to have mapped out their "limits of tolerance," they would risk all-out war rather than lose control of East Germany which they

consider as essential to their security as we do, say, the Panama Canal or Cuba.

6. To expect the Soviet rulers to accept proposals which would inevitably presuppose such drastic change in their regime is not warranted by any observation of the Soviet system. I do not see the possibility of such a radical transformation in the near future.

Even if the Soviet leaders prefer to achieve their goals without war (and I think they do), it does not follow that these goals are compatible with the survival of our society. It is still more clear that war cannot be excluded as an instrument of Soviet policy if their leaders conclude that their objectives can be attained only through force.

On the other hand, all social systems continue to evolve through time. The Soviet system has by no means remained static up to the present point. Yet, in contemporary U. S. S. R., policy is still being made by individuals whose basic character was formed in a revolutionary atmosphere and in a situation of isolation from the rest of the world. Hence, to speak of "controls * * * over the Soviet military establishment" strikes me as unrealistic for the immediate future. I would urge that we press for whatever disarmament and inspection we can obtain so long as we do not allow the U. S. S. R. to make too shrewd a horse trade. I think the present "limits of the possible" are within this realm of tactics and that it would be a great mistake for us to plan in too utopian a way. If we "keep our powder dry," much to our advantage can happen over the next 10 to 15 years and the aim of wide disarmament and mutual inspection on the necessary scale may become realistic.

REPLY OF PROF. W. W. KULSKI, MAXWELL GRADUATE SCHOOL OF CITIZENSHIP AND PUBLIC AFFAIRS, SYRACUSE UNIVERSITY, DECEMBER 23, 1956

1. Soviet statements and press articles on the risks of vast devastation which could be caused by a nuclear war seem to warrant the opinion that the Soviet leaders do not intend any longer to hide before their people the danger of such a war. The Soviet foreign policy has been careful enough since 1953 to avoid the risk of a general war which could become also a nuclear conflict.

This foreign policy seems to be founded, at least since Stalin's death, on three main postulates:

(1) That the nuclear stalemate precludes the possibility of modifying by force the existing status quo.

(2) That there is little chance of changing this status quo in Europe by other means.

(3) That the only battlefield open to a Soviet nonmilitary offensive is that of the underdeveloped countries where the so-called peaceful competition may be successfully waged by nonmilitary means.

The U. S. S. R. has been paying a steadily increasing attention to those underdeveloped areas, be they in Asia, Africa, the Near East, or Latin America. They, obviously, hope to increase progressively the Soviet influence there and also expect, in addition, to gather eventually the fruits of the activities of the local Communist parties. To wage this offensive they do not need to use military means. A skillful

use of other means does not involve the risk of a general war and yet promises success. Certain means are used both by the Soviet Union in her official foreign policy and by the local Communist parties. Such are the following means: anticolonialism, which allows the Soviet Union to appear as an ally of dependent nationalities and also of such formerly colonial countries which continue to be very sensitive to this particular issue, while the Soviet Union, for her own reasons, is always ready to prove her "sincerity" regarding anticolonialism by espousing every grievance of a colonial or formerly colonial country against a western power.

This same anticolonial theme makes it possible for the local Communists to masquerade as extreme patriots in espousing every anti-western cause. Another such nonmilitary mean, is the antiracialist propaganda directed against the Western Powers and exploiting another sensitive topic for nonwhite populations. A third is psychological; namely, a "fraternal" approach to the underdeveloped areas while avoiding the display of any national or great-power superiority complex. A fourth one is acquiring steadily increasing importance; it is a new economic approach to the underdeveloped areas through a barter trade which, basically, consists in the exchange of Soviet capital goods against the local agricultural produce, including the unmarketable surpluses, loans on convenient terms and without any visible strings attached, technical assistance tied up to the mutual trade, and so forth. The Soviet Union encourages, in addition, the policy of noncommitment, an attitude obviously welcome to such underdeveloped states which follow a policy of noncommitment. To increase the Soviet popularity two slogans are used: Peace, and the prohibition of atomic experiments. All those means have produced already some results in increasing the Soviet prestige. The basic aim is to create a gulf between the highly industrialized western nations and the underdeveloped areas which represent the majority of mankind. The goal is ambitious, and yet the means are nonmilitary. Thus the Soviet Union may pursue a dynamic foreign policy without endangering the nuclear stalemate.

It would be foolish on the part of the Soviet leaders to risk everything on one card of a general war while they expect to advance their cause by peaceful means. Moreover, they seem to believe that the same cause will be promoted over a period of the next two decades by other nonmilitary developments. They rely on the Soviet relatively higher rate of industrialization regarding the production of capital goods and on the industrialization of China and to some extent also of Eastern Europe. This is why they constantly talk about the U. S. S. R. eventually becoming the first industrial power of the world as their eventual target. The new program of a 10-year (senior high school), technological school training for all Soviet children, to be realized basically during the present 5-year plan and completed during the following plan, promises to yield within the next 15 years a highly skilled young manpower. This, also, is bound to increase the relative power of the U. S. S. R.

If it is true that the Soviet leaders expect that time is working for them, then it is logical for them to formulate such foreign policies which do not clash with the nuclear stalemate. However, it is probable that they would not accept a change in the present international

status quo to the prejudice of the U. S. S. R. and would then be ready to face the risk of a general war. The Soviet policies during the recent Near Eastern and Hungarian crises support this interpretation. Although the Soviet Government skillfully manipulated the threats of force to influence Britain and France, it was careful not to commit itself formally to any Arab country concerning the actual use of force against the West. It exploited and will exploit the recent events in the Near East for its own political benefit, but seemed reluctant to take any action which could possibly involve it eventually in a war with the United States.

At the same time, the U. S. S. R. proved in the Hungarian case that she would defend at all cost her acquired positions. She undertook a brutal action of suppression of the Hungarian revolution even at a price, heavy for her, of losing, at least temporarily, her political prestige among the Asians.

But all this does not mean necessarily that the Soviet Government sincerely seeks a general and effective agreement on nuclear weapons. They may be sincere in regard to a limited agreement forbidding further atomic experiments; they are committed to it by a long propaganda, and would be placed in an awkward position if they were to reject such an agreement. They would do it only in case where they would believe that a sudden suspension of atomic explosions would deprive them of an expected advance in the nuclear competitive knowledge.

2. A general agreement on nuclear weapons that would include provisions for an effective and tight control is a different story. The nature of the nuclear weapons would probably require opening for international inspection of every square mile of the territories of the contracting parties, of every plant and every industrial secret. Even so, the existing stockpiles of atomic weapons would be probably hard to detect. Without such a thorough control, the obligations of the contracting parties could be evaded. An international commission would have to work permanently on the territory of each contracting party. It could hardly rely on the cooperation of the local population, which would consider such a cooperation as close to treason; moreover, the Soviet population would be deterred from such a spontaneous cooperation by the additional threat of a quick governmental retaliation. The prospective conditions of work of the international commission of control would require, for this additional reason, very extensive powers and an unhampered access to the whole national territory.

The U. S. S. R. could hardly agree to it. The political operations of the regime require a certain amount of secrecy. For instance, the Soviet Government would hardly be pleased by the prospect of an international control commission's visit to the forced-labor camps or to places of production operated with forced labor. Morever, opening the gates of the whole Soviet territory to foreigners belonging to an international commission of control would make the U. S. S. R. lose a valuable asset, namely forcing the other powers to commit constantly errors of over or under estimation as to the true potential of that country. It is well known that the Soviet statistics are inadequate and that the actual production is partly shrouded in a state secret.

It is more probable that the Soviet Union would agree to a system of control with loopholes, if such a system were acceptable to the West-

ern Powers regarding the personnel of the armed forces and possibly the conventional armaments. A less than thorough system of control would be rather ineffective also in the case of the limitation of numbers of the personnel of the armed forces and of the conventional armaments. We know this from two sources: the inability of the Inter-Allied Control Commission in Berlin to detect all secret German evasions of the limitative provisions of the Versailles Treaty (1921–27), and the records of long discussions of the problem of control at the Geneva Disarmament Conference (1932–33).

It is a matter for the military experts to say whether an incomplete and therefore not very effective system of international control would be acceptable to the Western Powers in regard to the limitation of the personnel and conventional armaments. Assuming that such an international agreement were concluded, its serious evasions could be counterbalanced by the nuclear weapons. In case of the conclusion of such an agreement without truly effective control the absence of a parallel agreement on nuclear weapons would be in a sense an advantage; the nuclear weapons would remain an effective and ultimate sanction against a contracting power which would be tempted to make use of its armies and conventional weapons accumulated in violation of the international agreement.

Only a prophet could speculate on the probability of a deep change of the regime in the U. S. S. R. So far the present regime does not seem to be in the immediate danger of being overturned and replaced by another which would resemble even from afar a western democracy. As to a "peaceful" evolution, no regime evolves peacefully to the extent of denying its basic nature. For the time being the regime is not altered basically and goes on as before except for some Stalinist trimmings. Moreover, a quick and successful revolution in the U. S. S. R. would not guarantee that a new regime governing a strong Russia would be necessarily more accommodating than the present. Only a protracted revolution and civil war would have the effect of making Russia more accommodating, because she would simply be weaker. Political wisdom would require not to rely on happy expectations but rather to take for granted for the time being that we shall continue to face the same Soviet regime.

3. The U. S. S. R. does not intend to waive her right of veto for the simple reason that she knows from experience that she could not expect to muster a majority in any international body. Therefore, it is improbable that she would accept any enforcement agency to whose decision she could not oppose her veto especially on matters concerning herself or an allied state.

4. One should carefully distinguish between Soviet proposals which may be genuine and such others which are advanced for the sake of propaganda and in the hope that they would be rejected by the Western Powers. It seems highly unlikely that the Soviet Union seriously contemplates withdrawing her troops from Eastern Europe, if even such a move were counterbalanced by a withdrawal of other foreign troops, notably the American, from another part of Europe. This prospect seems even less likely after the events in Poland and Hungary. One must remember that Communist regimes were installed in Eastern Europe by Soviet bayonets. The recent events in Poland and Hungary proved that even 11 years were not enough to

implant the habit of those regimes in the native minds. It is therefore more than probable that the withdrawal of Soviet troops from Eastern Europe would be soon followed by a collapse of the local Communist regimes in all or most of those countries. Today a revolt against a local Communist regime entails the risk of a dreadful retaliation on the part of the U. S. S. R. which may swiftly intervene having her troops in or around all countries of Eastern Europe.

Hungary will remain as a tragic warning to other nations of Eastern Europe. But the Hungarian experience proved also that a local Communist government faced with a popular uprising could not rely on the loyalty of its own troops. Left alone those local governments would be constantly threatened by a possible revolt; a revolt in one country could then spread like a wildfire all over Eastern Europe emboldened by the absence of Soviet troops. A mass military action of the U. S. S. R. against the total insurrection of Eastern Europe would be of necessity a protracted operation with uncertain results and possible risks of a general war.

But the withdrawal of Soviet troops would entail another risk. Assuming that for reasons, unknown to this author, the Soviet Government were prepared to withdraw its troops from Eastern Europe and to run the risk of seeing the present Communist governments being replaced by non-Communist, could it expect that those governments would truly subscribe to a policy of noncommitment? A natural reaction against the Soviet domination could produce a powerful and spontaneous anti-Soviet trend in the local populations. Rumania, Hungary, and Albania have no state interests that would incline them to cooperate with the Soviet Union if they had non-Communist governments. But it is also doubtful whether the fear of Germany in Poland and Czechoslovakia, and the traditional quarrels with her neighbors in Bulgaria, would be strong enough to contain a popular wave of anti-Soviet revulsion in those countries. The U. S. S. R. could not be certain whether the Eastern European states, free of Soviet troops, would stay long neutral and would not try to be integrated within a western defense system. Could she be absolutely sure that the Western Powers would resist the temptation of such an extension of their defense system?

Moreover, why should the U. S. S. R., without being defeated in a general war, consent to abandoning Eastern Europe with its approximately 100 million people forced to work and thus increase the total economic potential of the Communist bloc? The Hungarian events might have the opposite effect of proving to the Soviet leaders that they must keep their own troops in Eastern Europe.

The so-called liberalization is now basically limited to Poland alone. The Hungarian revolution hardly encouraged the Soviet leaders to indulge in any further experiments with liberalization whose far-reaching effects they could not control.

As the satellite armies proved in Hungary and Poland to be unreliable, the U. S. S. R. could perhaps offer a reduction of those troops without withdrawal of her own as a "compensation" for, for instance, a sharp reduction in the Western German rearmament.

For the reasons indicated above, a neutral belt (without Soviet troops in Eastern Europe) covering Eastern Europe and some part of Central Europe now within the western sphere would not be

acceptable to the Soviet Union, whatever the Soviet Government may say to the contrary for propaganda reasons.

5. It is possible that the U. S. S. R. would accept an agreed-upon reduction of armed forces and conventional armaments if such an agreement would not entail a thorough international inspection. Her attitude in this respect might be sincere. Even reduced numbers of the Soviet troops would be sufficient to cope with the problems in Eastern Europe. The Soviet main protection against a general war is the capacity of a nuclear retaliation. If she does not intend to change the present status quo by military means, a reduction of armed forces and of the conventional armaments, compensated by equivalent reductions on the part of the Western Powers, might be welcome for certain domestic and even international reasons.

The extremely heavy human losses suffered during the Second World War and hence a reduction in the number of expected births, the lower postwar birthrate, the inadequate labor productivity in agriculture, have created a problem of manpower. Manpower is the limit of Soviet industrial progress. Therefore, an effort to increase the available manpower would be in the Soviet interest. Hence the announcement concerning a reduction of Soviet armed forces may correspond to actual facts and a further reduction through an international agreement might be welcome to the Soviet Government.

The matter of reducing conventional armaments is more complex. For instance, it is possible that this matter will be complicated by arming ground armies with tactical atomic weapons, because then the segregation of armaments into two separate categories, conventional and nuclear, might tend to become obsolete. But assuming that the Great Powers were able to solve to their mutual satisfaction this and other technical matters, including some sort of intermittent international control, the U. S. S. R. could welcome an international agreement on the limitation and reduction of conventional armaments for the following reasons. Most of the conventional armaments become obsolete after a certain time which is shorter if the armament competition is more intense. If the Soviet Government does not fear a war in the near future, it may be willing to conclude an international agreement on the mutual reduction of conventional armaments which would allow the U. S. S. R. to spend more effort on developing her capacity of manufacturing the so-called means of production. Those means of production represent the basis of the economic and hence military potential of any country. Thus the economic-military potential could be more rapidly increased by economizing on the national effort devoted to the production of conventional armaments. In case of emergency the U. S. S. R. would rely on her capacity of nuclear mass retaliation and the conversion of industrial production to the required level of output of conventional armaments.

The events in Poland and Hungary might have made the Soviet leaders more alert to the problem of consumer goods; the low standards of living in those two countries certainly contributed greatly to the unrest. The U. S. S. R. is not herself immune to a wide popular dissatisfaction with shortages of consumer goods, especially as the purchasing power of the population often exceeds the supply of those goods. The Soviet leaders were aware of this problem in 1953–54, but later returned to the Stalinist line of relegating this problem to a lower level of their planning.

A reduction in the output of conventional armaments achieved through an international agreement would allow for a greater output not only of capital goods but also of consumer goods. This in turn would keep the Soviet population more satisfied and would enable the U. S. S. R. to alleviate somehow the same problem in the satellite countries to avoid a repetition of the Hungarian events.

Finally, a conversion of industrial production to a greater production of capital goods would increase the Soviet capacity in assisting China and Eastern Europe in their process of industrialization and in extending the trade with underdeveloped countries.

Any such transition to a different type of production is much easier in the U. S. S. R. than in the democratic countries because of the Soviet centralized economic planning.

6. I am unable to answer the first half of this question. The second half begs the question of what one understands by the legitimate interests of the U. S. S. R. If one understands by these terms the security interests considered by the U. S. S. R. as her minimum requirement, then it becomes possible to answer the question. Beyond any doubt the Soviet concept of "legitimate" interests includes not only the security of the Soviet national territory but also the perpetuation of the division of Germany and the control over Eastern Europe. The latter control is conditioned by two minimum conditions spelled out by the U. S. S. R., namely the participation of the satellite countries in the Warsaw Pact and the existence of such satellite Communist governments which do not repudiate their allegiance to Moscow and do not follow the Yugoslav policy of noncommitment.

Any global deal, which would include an agreement on the reduction of armaments but was conditioned on the Soviet renunciation of those "legitimate" interests, would have hardly any prospect of being accepted by Moscow. Hence the concept of a neutral belt, combined with the withdrawal of Soviet troops from Eastern Germany and Eastern Europe, does not seem realistic. First of all, a plan for a unification of Germany after truly free elections in Eastern Germany would imply a major defeat for the U. S. S. R. It is sure that free elections in Eastern Germany would produce two effects: the end of the Communist regime, and the union of Eastern Germany with the German Federal Republic. Thus the U. S. S. R. would not only be deprived of the human and economic potential of Eastern Germany but would contribute to the re-creation of Germany as a first-class great power.

There is no doubt that the U. S. S. R. is completely serious in objecting to such a unification of Germany which would leave a unified Germany free to remain associated with the NATO. But one may doubt the sincerity of the Soviet statements to the effect that a unified and neutral Germany could be considered as a basis of discussion concerning the Germany unification. Even a unified Germany uncommitted to the NATO would represent a new powerful factor in European politics. The U. S. S. R. would have no means of controlling her foreign policy. She could prevent neither her massive rearmament nor even her reaccession to the NATO. Moreover, even a neutralist but unified Germany would be strong enough to press with new vigor for the return of those Germany territories which had been annexed by Poland and the U. S. S. R. (Eastern Prussia, northern

part). The U. S. S. R. would be placed before a difficult alternative: either to resign herself to the existence of an unfriendly Germany voicing her territorial grievances or to make concessions. A retreat from the Elbe through the unification of Germany might entail a further retreat from the Oder; this is surely realized in Moscow. But a retreat from the Oder might in turn weaken the Soviet position in Eastern Europe where she would have possibly to cope again with the German competition. One does not see any pressing reason why the U. S. S. R. should assent to a rapid unification of Germany even within some sort of a neutral belt.

The Soviet leaders have often stressed since the first Geneva Conference of 1955 that a unification of Germany requires two conditions: (1) That a unified Germany would not be committed to the NATO; (2) and that the economic and social "gains" realized in Eastern Germany would be safeguarded. This second condition is politically more important, because it cannot be accepted either by the West or the German Federal Republic. Its real meaning consists in conveying the Soviet unwillingness to consider seriously the unification of Germany and by implication any withdrawal of Soviet troops from Eastern Germany or the creation of a neutral belt.

Therefore, it seems highly doubtful whether the U. S. S. R. would barter Eastern Germany and even more Eastern Europe for some sort of a neutral or demilitarized zone in central-eastern Europe. The U. S. S. R. would have to be faced with a complete breakdown of her satellite system and feel completely unable to cope with such a situation, to discuss seriously the concept of such a neutral belt even if the latter belt involved some areas now within the Western Zone.

A western proposal to create such a neutral belt covering Eastern Germany and Eastern Europe as well as some specified areas within the Western Zone in Europe would have nevertheless a certain undeniable value. It would show the western willingness to meet the Soviet Union halfway, a consideration important for the western relations with uncommitted nations. It would probe the Soviet sincerity in the disarmament discussions. If the U. S. S. R. would accept the concept of such a neutral belt, it would reveal the extreme seriousness of the situation in Eastern Europe and the inability of the Soviet Union to cope with it without running the risk of such implications which could lead to a general war (for instance, the need for a large-scale Soviet military action in both Poland and Eastern Germany). Therefore, a western proposal to this effect would make sense even if the probability of its being accepted by the U. S. S. R. does not seem, under the present circumstances, to be great.

Reply of William L. Langer, Director of the Russian Research Center, Harvard University, December 18, 1956

1. It seems to me that Soviet leaders cannot have failed to recognize the threat of mutual annihilation implicit in the new weapons. It is at least plausible that such recognition may have underlain their efforts of recent years to avoid involvement in major conflicts. It is, of course, difficult to point to any one such instance, but it should be remembered that the Soviet Union might have taken a more active and aggressive role in various areas and issues, such as Korea and

Indochina, to say nothing of the Taiwan dispute, the German problem, etc. It is my own impression that they are restricting their interference in Hungary to the minimum regarded imperative to hold the Communist bloc together. Whether and when their appreciation of the situation may lead them to seek agreement on control of weapons it is hard to say. It would, in fact, be difficult to recognize such effort as sincere even if it were so. I suspect that the Soviet Government would even now welcome agreement on nuclear weapons if such agreement did not involve too close inspection or control, and if it left more or less intact the Soviet superiority in conventional forces and equipment.

2. The Soviet Government would probably accept comprehensive and effective inspection only under pressure of great necessity. The second part of this question is too far-ranging to be answerable, but I would doubt whether, in the foreseeable future, one could expect the Kremlin to go beyond inspection in the satellite area. Conceivably it might accept a greater measure of inspection if United States forces were withdrawn from Europe and the United States abandoned its European bases. In such case the Soviets might permit inspection in the thought that they could, if necessary, ignore the consequences of such inspection. It would seem reasonable to suppose that a more democratic system of government in the Soviet Union would facilitate agreement on inspection, but this is purely conjectural.

3. This question is for the most part subsumed in question 2. I do not believe that the Soviet Government would accept any agency, such as an enforcement agency, that would infringe its sovereignty. In any case, it is inconceivable that it would do so excepting under direct pressure of circumstances.

4. The presence or near proximity of Soviet forces probably has much to do with maintenance of Communist control over the states of Eastern Europe. Nonetheless, conditions may well develop in some of these countries to the extent that the Kremlin may think it advisable to withdraw its forces completely. It could probably do this with relative safety, as it could easily proceed to military reoccupation if necessary and in any event could profit from the threat of aerial bombardment (conventional or nuclear) which is always at its disposal. It seems to me highly unlikely, however, that the Soviet Government would withdraw its forces from the satellites unless at least United States forces were withdrawn from Europe, and American bases, at least in Europe and the Mediterranean, were given up. It might then agree to a neutral or disarmed and supervised belt, the more so as such a situation would be greatly to its advantage, considering its proximity to the area. In my opinion, the Soviet Union would go a long way, especially toward paper agreements, in order to secure the withdrawal of United States troops from Europe and the abandonment of United States bases.

5. One might reply to this by asking the question whether there is any nation that would not like a reduction of the crushing burden of armaments? I regard it as highly likely that the announced troop reduction of 1,800,000 men by the Soviets is due to the desire to secure more manpower for industry. It is difficult to see how the Soviet Union can maintain its high productivity in the field of capital goods and at the same time increase production of consumer goods without

securing additional manpower. It may well be that it would like to divert part of its industrial potential from war production and it is highly probable that the popular pressure for more consumer goods will weigh heavily in the making of future decisions. I believe that the greatest likelihood of a change in policy on the part of the Kremlin may come from such internal pressures, both in the Soviet Union and in the satellites and I would think that the best hope of some progress toward disarmament may result from domestic needs and developments.

6. We have no experience to guide us in the matter of effectiveness in disarmament controls, especially in the atomic age. In general, however, it should be said that almost any form of control can be obstructed and, if necessary, defied. In the whole matter of disarmament it seems obvious that the key factor is that of confidence. Two nations that trust each other are not apt to have grave misgivings about their armaments. On the other hand, it is most improbable that either one of two nations hostile and suspicious of each other's intentions, should accept any agreement in good faith that might conceivably reduce its relative capability either for offense or for defense. While I agree that the United States has a moral as well as a practical obligation to explore every proposal for reduction of armaments, it strikes me that the larger and more important objective must be to remove or alleviate hostility and build up, so far as possible, a measure of mutual confidence.

REPLY OF ALFRED G. MEYER, DIRECTOR OF THE RESEARCH PROGRAM ON THE HISTORY OF THE CPSU, COLUMBIA UNIVERSITY, DECEMBER 18, 1956

A. GENERAL REMARKS

1. Soviet policies and attitudes cannot be viewed in a vacuum, but only in their interdependence with the world situation, including the policies and intentions (real or imagined) of the United States.

2. The disarmament problem cannot be separated from the world situation in general, and the cold war in particular.

3. The cold war (i. e., the rivalry between the U. S. S. R. and the United States) is no longer the dominant feature of contemporary world politics. True, these two countries are today the dominant powers; their influence, wealth, and might towers over that of all other nations, and their exclusive possession of thermonuclear weapons symbolizes their dominant position But tomorrow, i. e., within the next 10 years, there will be additional great powers, such as India, China, a possible United Europe, etc., possessing the same attributes, including thermonuclear weapons. Tomorrow's world will be a pluralistic, not dualistic one. For this reason, the view of the Soviet Union as America's sole antagonist in world affairs is shortsighted; and the widely held idea that the destruction of the Soviet state (at least in its present form) would assure the world continued peace and prosperity is nothing short of foolish. It can be argued with a great deal of evidence, for instance, that the progress of international communism has been considerably retarded since 1917 by the existence of the U. S. S. R. as the self-styled leader of the world revolution. Had Russia not been communistic, or had communism not started in Russia, the victories of communism might have been far more

important. Today, too, if the Soviet Union were destroyed or weakened, world communism would thereby be invigorated, and the revolution of our age would proceed at an accelerated pace. This assertion may startle you, but I think it can be backed up by a mass of evidence.

4. The main objectives of United States foreign policy must be seen in terms of such developments. In connection with the disarmament problem, such objectives may be defined in the following manner:

(*a*) The main objective to be safeguarded is the security of the United States. Security lies, among other things, in the possession of thermonuclear weapons, and in every potential enemy's knowledge that we are ready to use them. In opposition to the widespread feeling that in view of the "nuclear stalemate" "there is no alternative to peace," more realistic political scientists have argued that only a skillful brink-of-war policy can give security to the United States.[1]

(*b*) The possession of thermonuclear weapons can be a deterrent, but does not constitute a defense against thermonuclear aggression. On the contrary, it has been argued convincingly that there is no defense against such aggression. For the first time in history, even the greatest powers can no longer defend themselves adequately against existing means of destruction.[2]

(*c*) The limited security-through-deterrence which lies in the possession of thermonuclear weapons is provided only as long as they are not used by others or by our own selves because the destructive energy of these weapons is not subject to adequate control, all destruction wrought by them means at the same time the self-destruction of the user.

(*d*) Security therefore lies not only in the possession of thermonuclear weapons, but also in their destruction. The interest we have (as Americans and as human beings) in the destruction of such weapons is so great that it is worth substantial sacrifices in the temporary position the United States maintains in the world power alinement. Of course, one concession we cannot afford to make is to destroy our own weapons while another power retains its stockpile. In talking about the destruction or dismantling of thermonuclear weapons, I am aware that due to my ignorance of the scientific and technical questions involved I may be talking nonsense. Clearly, a dismantling of existing weapons which would permit rapid reassembly will not do. Instead, it might be necessary to dismantle entire industries devoted to the manufacture of essential parts of such weapons. But, since it would be foolish to posit the dismantling of any industrial or scientific establishments that will advance man's scientific and technological progress through the peaceful and constructive use of fission and fusion energy, it would make sense to talk about the destruction of weapons only if activities devoted to the manufacture of death could be distinguished clearly from activities devoted to more productive efforts. Here the statesman must rely on the advice of the scientist.

(*e*) In addition to security from destruction and security from self-destruction, one other objective of United States foreign policy is to

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[1] See, for instance, Henry A. Kissinger, Force and Diplomacy in the Nuclear Age, Foreign Affairs, April 1956, pp. 349–366. Hans J. Morgenthau, Has Atomic War Really Become Impossible? Bulletin of the Atomic Scientists, XII, 1 (January 1956), pp. 7–9.

[2] See Eugene Rabinowitch, Ten Years That Changed the World, Bulletin of the Atomic Scientists, XII, 1 (January 1956), p. 5.

maintain or obtain the good will of the governments and peoples abroad. We should strive to obtain this good will not because it tickles our pride, but because it is a power factor of growing importance in world politics. Modern technology has given the material preconditions for the growth of a world community transcending national bounds. Political developments are slowly but perceptibly catching up with technology, and we have witnessed in the past decade the first beginnings of the formation of a worldwide political community. In the measure in which its development continues, public opinion—in this instance, world opinion—will be a factor of increasing importance to the Government of the United States. World opinion can be expected to acquire a growing tendency to restrain governments and to force their hands; and this will come to include even the superpowers, ourselves and the Soviet Union. In acquiring the good will of the world, a government will therefore be able to exert considerable influence on other governments.

The good will of world opinion can be obtained only by that moral superiority which is expressed in forthright and generous deeds, not unctuous words; or, if not in unilateral deeds, then in workable and acceptable proposals for joint action. Applied to the disarmament problem, this means that we shall have to force the U. S. S. R. into disarmament by morally impeccable proposals containing no escape clauses for ourselves or afterthoughts. On the contrary, any honest proposal made by us must contain the possibility that the position of the United States in relation to the U. S. S. R. might be weakened temporarily. The long-run benefits will far outweigh the sacrifice.

An example of such a proposal would be to let a United Nations team or another supranational force[3] simultaneously dismantle all Soviet and United States thermonuclear weapons. This may sound utopian. But it is in fact based on the realistic argument that either we do or do not destroy these weapons. There is no workable middle way.

B. ANSWERS TO THE QUESTIONNAIRE

1. There is little doubt that the Soviet Union recognizes the threat of mutual annihilation and therefore shares with the United States the general aims outlined in A, 4, a–d, above. One might cite Malenkov's unequivocal statement that atomic war will mean the end of civilization, or the text of the Indian-Soviet joint declaration of December 13, 1955.

One could also infer such awareness from other signs of a conciliatory mood in the Kremlin, signs which are neither unambiguous nor necessarily derived from a horror of atomic warfare. Still, it is at least a straw in the wind to find, for instance, that Soviet international law authorities have recently tended to accept peaceful international processes in Soviet relations with the West rather than assume the inevitability of struggle. Still, even at the XXth Party Congress, the admission that world history might henceforth proceed by peaceful evolution was hedged in. Obviously, the Kremlin leaders themselves are not of one mind in this matter. Nor should we be deceived

[3] For an interesting proposal of such a force, see Hans Apel, Proposal for a Surnational Peace Authority, Bulletin of the Research Exchange on the Prevention of War, IV, 3–4 (May–July 1956), pp. 37–41.

by their eagerness to show monolithic unanimity into believing that they are of one mind on any important issue.

Two facts make it fairly plausible that Soviet leaders are conscious of the threat of mutual annihilation. One is the considerable respect they afford to their scientists. Since in this country it has been the lobby of atomic scientists which has forced our Government and some sections of the public to recognize the threat, it is plausible to assume that a similar process has taken place in the U. S. S. R. The other is the fact that for some time the U. S. S. R. faced a hostile America having sole possession first of atomic and later of thermonuclear weapons. There is overwhelming evidence that the Kremlin was aware of the gravity of this threat, hence the disastrous consequences of nuclear warfare in general.

On the basis of such arguments, it might be possible that Soviet leaders (some if not all) will recognize a mutuality of interest in preventing nuclear war. The possibility of this must be seen in the light of the following considerations:

(*a*) Soviet leaders have almost unsurmountable difficulties in recognizing any mutuality of interests. Instead, their entire way of thinking and policymaking is based on the assumption of a hostility between the Soviet and non-Soviet world that may be alleviated temporarily, but is unbridgeable in the long run. This feeling of basic hostility is partly based on Marxist-Leninist principles and beliefs, such as Lenin's conviction that politics is war of all against all, and that the guiding idea in politics is to see who "gets" whom. But, to an equal degree, the feeling of hostility is based on experience. A look at the map will show that the U. S. S. R. before 1949 did indeed face "capitalist encirclement," being a Communist island surrounded by a non-Communist sea. And ever since the revolution they have faced diplomatic, economic, ideological, and military threats. Soviet thought about world affairs has therefore been marked by a very aggressive defensive attitude—an attitude of defiance and morbid suspicion, a readiness to sound the alarm at the slightest provocation, real or imagined.

(*b*) Since the battle of Stalingrad, or more generally since the middle of the the 1940's the U. S. S. R. has emerged as 1 of the 2 great powers, and since the defeat of the Kuomintang the Communist world has broken out of the ring that surrounded it. The Soviet Government has shown itself aware of its new status, but its reaction to the new situation has been highly ambiguous. On the one hand, its leaders show a cockiness which corresponds to their country's strength; on the other hand, this same strength allows them to be more conciliatory. The same conflicting postures, however, were taken also in previous times, when all Soviet policymakers still seem to be divided over the stress they should give to their country's new strength. Quite rightly so: technologically, militarily, economically, the U. S. S. R. is one of the Big Two; but among the Big Two she is only second best. But to be second best in war means to be the loser.

(*c*) In the question of disarmament, the leaders of the Soviet state have, from the very beginning of its existence, been interested in disarmament and vigorously, though completely unsuccessfully, promoted it. They have always been perfectly sincere about these efforts to promote disarmament for the simple reason that militarily they

have always been outmatched by their potential enemies. To this must be added a double economic reason: to the U. S. S. R. armaments have been a terrible burden, while in their Marxist views the western system of free enterprise has depended on the systematic waste entailed by armaments to keep functioning.

(*d*) The position of the U. S. S. R. as underdog in the armaments race has now changed; and it can be expected, therefore, that on these grounds at least the Kremlin has lost its previous great interest in disarmament. Other motives supporting disarmament, however, remain or have been added. In addition to the economic motive, there is Soviet awareness of world opinion. While the Kremlin has shown itself extremely skillful in taking advantage of favorable world opinion and in promoting its own cause in the world, they have at crucial points been ready to disregard world opinion entirely or give it only slight consideration. Their awareness of world opinion is, therefore, a factor which cannot be weighed accurately.

(*e*) A much more important factor is the domestic problem the Kremlin faces in case of war. Most American political scientists unthinkingly repeat the theory that totalitarian dictatorships depend on war and that indeed the Soviet regime would collapse if it were "contained" from waging aggressive warfare. This may have been true of the German and Italian brands of totalitarian dictatorship, but the contrary is true for the Soviet Union. While it is useful for Soviet rulers to maintain a warlike xenophobic spirit among its people, the experience of World War II has shown clearly that the danger of internal collapse approaches precisely when the country gets involved in a foreign war. Never was the Soviet regime in so immediate a danger of internal defeat as in the fall of 1941. Knowing this, it is my firm belief that the Soviet leaders regard it as an essential element of their national interest to stay out of war. They still think primarily in terms of defense rather than expansion. Even today they seem to stress defensive as against offensive weapons in their ambitious armament effort (for instance, submarines rather than aircraft carriers).

(*f*) It must be clear to the Soviet leaders that their present position of military equality with the United States rests solely on their possession of thermonuclear weapons. Do away with them and with atomic weapons as well, and the U. S. S. R. will once again be second best. Nevertheless, I believe they are, or could be, interested in the total abolition of atomic and thermonuclear warfare for the reasons given above. Moreover, the Soviet leaders still seem convinced that time is in their favor. Economically and politically, they believe they have nothing to lose by peaceful isolationism, whereas they expect that we are threatened with great difficulties if our worldwide expansion is contained. And in their view, our expansion is already being contained, and our strength being sapped by the ever spreading fire of revolution in Asia, Africa, and South America. At the same time, they will not lose an ounce of their morbid suspicion and nervous vigilance against the slightest increase in our strength or stiffening in our attitude.

Some would challenge my assertion that Soviet military equality depends on their possession of thermonuclear weapons. They would point out that, assuming the absence of such weapons, the Soviet

orbit would face the West with a vast manpower superiority. The relative weight of manpower in overall military potential, however, is at least debatable. While Soviet superiority in this field cannot be disputed, the United States, even without thermonuclear or atomic weapons, would still have an overwhelming superiority in industrial potential. In addition, it must be remembered that the U. S. S. R. has some degree of superiority because of America's greater vulnerability, especially as long as both of the big powers continue to possess nuclear weapons. By the time the U. S. S. R. will have caught up with the United States in industrial potential, the power structure of the world will have changed sufficiently to make all present calculations meaningless.

2. Inspection: Any answer whatsoever must assume that once all weapons are destroyed an effective method of inspection could be devised. Whether this assumption is realistic is for the scientists to determine. My impression is that scientists have grave doubts about the feasibility of an effective inspection system. But, given the above assumption, my feeling is that the Soviet leaders might permit two types of inspection, on the basis of the strictest reciprocity:

(1) Harmless, ineffectual schemes, such as a limited adaption of the "open skies" proposals.

(2) Really effective inspection by a supranational body, combined with or following the destruction of all thermonuclear weapons. But the chances for this are very slim indeed.

I cannot envisage any changes in the Soviet Union which would bring about a greater willingness to permit effective inspection, short of another Russian revolution. At the same time, an overall settlement of the cold war might bring about such willingness even without any structural changes in the Soviet political system.

3. It is very hard to say to what extent present or future Soviet policymakers would submit to an enforcement agency. The reason is that they have never been confronted with a really hard-hitting proposal. It is time a really sweeping proposal for enforcement were made to them, forcing them either to put up or shut up. The ensuing dilemma might even lead to internal political changes favoring the establishment of effective inspection and enforcement.

4. Prior to the events of last fall in Poland and Hungary I would have said that the U. S. S. R. might consent to withdrawal of its troops from Eastern Europe if NATO were dissolved and Western Europe sailed into neutralist waters. While a withdrawal now seems entirely out of the question, I should still say that even now the U. S. S. R. might withdraw from Eastern Europe in conjunction with an overall settlement of the cold war, entailing among other things the neutralization of Europe.

The events in Hungary have somewhat confounded us all. Immediately after making a surprisingly meek withdrawal in Poland, Moscow brutally reasserted its tottering supremacy when the Hungarian revolution went out of control. It is possible that we attach too much significance to this Soviet about-face. The military interest that the U. S. S. R. has in Hungary and in the rest of Eastern Europe is very great indeed, but it would decline somewhat were all of Europe, especially Germany, neutralized. The economic benefits the U. S. S. R.

has derived from exploiting Eastern Europe are far less important to Moscow, in my estimation. Finally, politically, Eastern Europe might become such a liability to the Kremlin that they would make the decision to release these countries with a good deal of relief some day.

The events in Hungary have shown that the allegiance of the People's Democracies of Eastern Europe depends on the presence of the Soviet Army. If they pulled out, each one of the satellite states would be shaken by revolution. But even if they do not pull out, the unrest in Eastern Europe is not likely to abate; on the contrary, I foresee possible years of continued restiveness and rebellion, keeping the Red Army busy, draining Soviet economic resources or at least negating all economic benefits, voiding all political credit that the U. S. S. R. might have in the world, and nurturing discontent among the Soviet citizens at home. Everything and anything is possible in revolution. But the United States should at least make efforts to channel spontaneous events into desirable directions (for that is the essence of political leadership). And we should be guided in this not only by our own ideas concerning the best form of government and the most desirable structure of society, but even more by the genuine wishes of the people in the areas affected. This means that in some areas the wisest policy would be to give support to democratic socialists or even to parties experimenting with democratic communism; for the only alternatives to such regimes might be either chaos, stagnation, or totalitarian dictatorship of the right or the left. Whatever party or coalition we decide to support, our support should be given vigorously and unhesitatingly.

5. I fully agree with the Secretary of State in his analysis of the burden which the armaments race places on the Soviet economy and the consequences disarmament would have on it. But I totally disagree with him in the conclusions drawn from it. To Mr. Dulles, the economic benefits that the U. S. S. R. would derive from disarmament appear to be an argument against disarmament. I, on the contrary, believe that a farsighted United States Government should welcome the relief of economic distress wherever it may be brought about. In the long run, the interests of the United States will be promoted most effectively by policies based on the principle, what is good for the world is good for America, on the belief that by aiding the economies of less richly endowed nations, either directly or indirectly, we will be aiding our own economy and improving our own political position. The United States will be able to maintain world leadership only if it uses its wealth of resources, skill, and productivity for the benefit of the world at large and enables or prods Soviet Russia to rival us in this constructive endeavor. In promoting realistic disarmament proposals, our Government should therefore stress the benefits accruing not only to the Soviet economy and the Soviet consumer, but also to the underdeveloped nations, as potential beneficiaries of Soviet aid.

While economic problems are outside my narrow field of studies, my impression is that for the last quarter of a century the Soviet Union has been short of manpower. If this is true, then a reduction of her armed forces would directly benefit her economy. In any event, Soviet manpower seems to be more easily converted and shifted, so

that the U. S. S. R. would probably face less difficulty in converting soldiers to civilians than this country. This should not, of course, blind us to the tremendous economic benefits our country would derive from disarmament. Certainly we would forfeit all claims to leadership and imagination if we let ourselves be scared by the brief pangs of conversion into overlooking the fantastic possibilities of enriching ourselves and the entire world by putting to constructive use the vast resources now being invested in the manufacture of means of destruction.

6. What are the legitimate security interests of the U. S. S. R.? The concept of legitimate interests is a political concept, not a legal one. That means that it is defined not on the basis of abstract (legal) principles or rules, but on the basis of power. A legitimate interest is that interest which a sovereign state can defend successfully.

If the world is regarded as a jungle in which sovereign states, responsible to none, fight for power in peace and war, this definition of legitimate interest prevails. But if the world is seen as one political community, in which each nation represents an interest group comparable to the multitude of groups in smaller political communities, then only those interests can be recognized as legitimate which do not conflict with the interests of the community as a whole. Again, the nature of these various interests is in every case decided in the political process. That means that the irresponsible interests of powerful groups (monopolies, national minorities, unions, ruling classes, sovereign states) will be curbed in the measure as the community as a whole emerges as a political force.

Disarmament, peace, worldwide democracy, and worldwide prosperity today depend on the promotion of such a political community. The very concept of a national interest in the traditional sense of the word (linked with the concept of sovereignty) is one of the major obstacles in this. The cold war has stiffened both major powers in their defense of the national interests, and the rising nations of Asia, Africa, and Latin America are following our example. This stiffening expresses itself in the rigid legalism, in which Soviet diplomats especially have become past masters. Again the United States can take the lead. By making bold, pioneering steps in promoting the growth of a world community, it can shame the U. S. S. R. into gradual abandonment of this legalism. We should, by our own example, show the world that sovereignty is as reactionary a concept as old-fashioned, irresponsible insistence on the absolute sanctity of private property, as against the right of eminent domain, and that the legitimate interests of even the leading powers must be curbed by the overriding interest of mankind.

Reply of Prof. Nicholas N. Poppe, Far Eastern and Russian Institute, University of Washington, December 16, 1956

Question No. 1

Answer: I do not believe that the leaders of the U. S. S. R. recognize the threat of mutual annihilation created by nuclear or thermodynamic weapons, in the same manner as the non-Communist world does. I base this statement on the words spoken by Khrushchev who said that it is impossible that the entire human race could perish in

consequence of nuclear warfare. He said that large groups of people would survive. I think that the number of people killed or crippled will be enormous if nuclear weapons are to be used. And it is easy to understand why the non-Communist world is so afraid of an atomic war. But the Soviet leaders do not think so. They do not care for how many people might be killed. Sufficient evidence is given by the mere fact of existence of concentration camps in the U. S. S. R. It is commonly known that the concentration camps in the U. S. S. R. have killed about 25 million people in these 30 years or so after the first concentration camp had been organized in the former Solovetski monastery on an island in the White Sea which is part of the Arctic Sea. It is also known that in World War II the Soviets were very little concerned about casualties. Very often they would attack a position, held by one German regiment, with 10 or 20 divisions and take it at the price of thousands of casualties. Sacrifices of human lives do not mean anything to the Soviets. If they could achieve a victory over the free world at the price of 75 percent of the entire population of the U. S. S. R. dead, they would gladly wage such a war promising them victory over the non-Communist world. If the free world thinks that the Soviets will never wage an atomic war out of fear that it might cost them millions of dead, then the free world is greatly mistaken. Human life does not mean anything in the U. S. S. R. It is manure for the Communist crops.

I do not see that the recent policies of the Soviets reflect the assumption that prevention of a nuclear war is in the mutual interests of both the free world and the U. S. S. R. On the contrary, they explode more and more nuclear bombs, and not so long ago, the Soviet leaders even threatened Great Britain by saying that the latter could easily become a victim of modern methods of warfare used against that country by a "stronger nation." It is not hard to guess who is meant by that "stronger nation." To this should be added the recent abusive address of foreign diplomats by Khrushchev who bluntly said that the Soviets would bury "all of you." Thus, Khrushchev uses threat. He is aggressive and his speeches can be interpreted only as a threat to use the most destructive weapons which will enable the Soviets to bury the non-Communist world.

Therefore, I do not believe that the Soviets will seriously seek agreement on control of weapons. This disbelief of mine stems from my general mistrust of whatever the Soviets say or do. Their disarmament talks are only propaganda.

Question No. 2

Answer. I do not believe that the U. S. S. R. will be opened to inspection. The Soviets may propose to create a 500 or 1,000 miles wide border line open to inspection, but they will not open the whole of the U. S. S. R. It is commonly known that supersonic aircraft and installations for launching of rockets must not be necessarily stationed in the immediate vicinity of a nation to make the latter vulnerable. As the whole of the U. S. S. R. will not be opened to inspection, the question about how much of it should or could be opened becomes rather irrelevant.

Why will the leaders of the U. S. S. R. not open their whole territory to inspection? Suppose military observers will be admitted. But will they not see there concentration camps, jails, teams of slaves

digging canals, building railroads, etc.? Can the Soviets expose the side of Soviet life to foreign observers? And if the Soviets try to conceal their concentration camps and succeed in doing so, where is there a guaranty that they will not try to conceal also other things such as atomic installations, rocket bases, etc.?

And who will believe in the willingness of the Soviets to admit observers after the Secretary of the UNO was not permitted to enter Hungary?

I see no future changes in this attitude of the Soviets. On the contrary, the Soviets will be even less easy to deal with after these recent revolts in Poland, Hungary, etc.

However, to leave for a moment the world of reality and move into the realm of speculation and fantasy, let us assume for an instant that the Soviets might agree to open their territory to inspection. This might be possible in a very remote future and only if—

1. All concentration camps are closed and no equivalent of such camps is tolerated in the U. S. S. R;
2. Slave labor is abolished;
3. General economic and political conditions greatly improve;
4. The collective farms really produce more and better grain and other products than the old, privately owned farms;
5. In one word: if there will be nothing to hide, nothing to conceal, and if the Soviets, on the contrary, will be even eager to demonstrate the "decadent capitalist world" their "happy people and their prosperous and cheerful life."

However, I am sure everyone will agree with me that this picture is highly unrealistic. Therefore, my opinion is that the Soviets will never open all areas of the U. S. S. R. And as the U. S. S. R. is vast and in the woods and marshlands of Siberia anything and in any quantity can be hidden, the free inspection in some areas will be of little real value. Perhaps, the military experts will correct me and say that even this sort of inspection will be valuable, but I reserve for myself the right not to agree with them in this point.

Question No. 3

Answer. The Soviets will never agree to an enforcement agency which will consider and deal with violations of the disarmament agreement. Such an agency could practically be either a UNO or a United States agency. The Soviets have not permitted their Hungarian puppet government to admit an observation team of UNO representatives and even the Secretary of the UNO, Hammarskjöld, could not enter that country at the time of the bloody suppression of the Hungarian revolution. It is still less probable that they will admit a UNO or United States agency into their sacrosanctum, the restricted areas of the U. S. S. R. where all their military secrets are guarded. The Soviets have so often used their veto to frustrate any decision by the UNO which might be unfavorable to the Soviets that it is beyond doubt that no such agency will be able to carry out its tasks.

Question No. 4

Answer. The Soviets might be willing to withdraw their troops from Eastern Europe only after they are absolutely sure that the Communist regime in their satellites has been so firmly established

that no changes in the political structure, no revolts or revolutions will be possible. This means that the Soviets might withdraw their troops after their satellites are firmly integrated in the Soviet system, as firmly as any Soviet union or autonomous republic within the framework of the U. S. S. R. Besides, a precondition for withdrawal will certainly be the withdrawal of all United States units from any place in the world outside the United States. And finally, the third prerequisite will be the disbandment of the NATO.

The question about the "likelihood of further developments in the direction of liberalization" can be left unanswered in view of the recent events in Hungary which have clearly demonstrated that the de-Stalinization has not brought any essential changes and that the Comunist regime in the U. S. S. R. has remained absolutely the same in essense as under Stalin. The "further" liberalization is still less probable.

The events in Hungary have also demonstrated that the creation of a neutral belt is impossible, because that hypothetic neutral belt must be a pro-Communist belt and not simply a neutral one, in order to be acceptable to the Soviets. And what does the word "neutral" mean? We understand it as impartiality or as taking neither side in military questions, and a neutral country is, as we understand it, a country which would never conduct a war (unless it is attacked). But the Soviets do not accept this idea. Communism is an ideology but not merely a political system. An ideology can never accept neutrality, absolute neutrality. "Either someone is with us or he is against us," said Lenin and continued, "One who is not with us is against us."

And finally, let us assume for a moment that the Soviets will agree to a neutral belt. Is there a guaranty that those "neutral" countries will not have a strong police force with planes and tanks similar to the "people's police" in East Germany? And is there any guaranty that in the case of an armed conflict somewhere in the world those "neutral" countries will not send armies of "volunteers" to help Communist rebels against their legitimate government? There is no guaranty and I am absolutely sure that this is exactly what the "neutral" pro-Communist belt will do. Such a belt can become a really neutral one only in the case of a complete change of the regime. As one will remember Hungary wanted to become a neutral country. This desire was one of the leading ideas underlying their struggle for independence, but the Soviets have not permitted the Hungarians to become a neutral and democratic country. After this example of the Soviet attitude toward neutrality and democracy, one can hardly expect sincerity and honesty on the Soviet side.

The question about the extent of the dependency of the Soviet domination over Eastern Europe upon the presence of Soviet armed forces in those countries has been fully answered by the events in Hungary. The Communist regimes in the satellites would instantly topple the same moment the Soviets leave. Only the brutal force of the Red army can guarantee the Soviet leaders the further existence of the Communist governments in the satellites.

Question No. 5

Answer. One should not exaggerate the cost of rearmaments to a regime such as the Soviets. In a country where all the industries, raw materials, soil deposits, transportation means, banks, etc., are government owned, and where the labor is extremely cheap (an average Soviet

worker earns one-tenth of what an American worker earns), and where slave labor is abundant, the production cost is much lower than in a country like the United States. The basic axiom is that the lower the living standard, the lower the production cost and vice versa.

The conclusion from this is that the high cost of rearmament is much less burdensome to the Soviets than it is to the free world.

To this the following should be added. Some students of Soviet affairs believe that the rearmament of the Soviets in the postwar period is particularly burdensome to the Soviet economy. However, the truth is that the Soviets have not started spending their money in such large amounts recently. They were always spending billions of gold rubles on items which do not bring any returns to the Soviet economy. First of all, since 1921 the Soviets maintained schools and universities for Chinese, Malayan, Indian, Moslem, etc., Communists in the U. S. S. R., and various training and indoctrination centers where foreign Communists were trained. They published propaganda books and papers in all languages of the world and sent them free to all countries. The Soviets equipped the Chinese Communist army, trained Red Chinese officers in Soviet military academies. The Soviets supported the anti-Franco Communist movement in Spain in 1936–38, equipped Red Spanish military units, trained their officers, sent them ammunition, etc. The Soviets give full economic support to their satellites in Asia, e. g., Outer Mongolia or the so-called Mongolian People's Republic which costs them millions every year. The Soviets have been spending these millions and billions for at least 30 years. Thus, the new expenses on supersonic aircraft, atomic bombs, etc., are nothing new in the Soviet budget. The Soviets have always had a special item in their budget; namely, allotments for the "export of revolution" and for subversion in other countries.

The recent reduction of the Soviet troops by about 1,800,000 men can hardly be attributed to economic consideration.

As a matter of fact, the Soviet Army has been, for many years, overmanned. The Soviets have been keeping an army of approximately 4 million men. This is, of course, too much for peacetime. Even in the event of an emergency the remaining 2,200,000 men represent an army by far exceeding anything on the European or Asiatic Continent. The main point, however, is that in the atomic age the Soviets need not a 4 million army. And this reduction is, to me, an irrefutable evidence that the Soviets do not believe in an agreement on atomic weapons and their abolition.

It is doubtful that the Soviets will reduce their armed forces still more in the future, because the Soviet military doctrine recognizes, even in the atomic age, the necessity of a large land army for occupation purposes.

Question No. 6

Answer. The legitimate security interests of the U. S. S. R. can be easily formulated. They are the same as the legitimate interests of any past or future regime in Russia. These interests are:

1. The guaranty that the U. S. S. R. will not be attacked by any other nation or group of nations.
2. A guaranty of the U. S. S. R. frontiers (which must be defined in view of the fact that the annexation of the Baltic States has not been recognized by the United States and some other nations).

3. A guaranty that the interests of the U. S. S. R. in areas defined under the Yalta and Potsdam agreements will be safeguarded.

4. A guaranty that no nation will officially support or tolerate any activities directed against the Soviet regime.

This does not mean, of course, that refugees and emigrants must be deprived of the right to express their ideas about the Soviet regime, but they must not overtly enjoy support by any government which has diplomatic relations with the U. S. S. R.

These are the minimum requirements. As a matter of fact nobody is going to attack the U. S. S. R. or to revise its frontiers, but it will be hard to convince the Soviets that this is so. The matter is that the Soviet interpretation of many words and terms is different from our interpretation. Thus, the Soviets regard as spy work thousands of activities which are not spy work as we understand them. Photographing of cities, railroad stations, factories, military parades, ships, airplanes flying high in the sky, etc., is looked at suspiciously by the Soviets. Frank discussion of what is going on in the U. S. S. R. is labeled as anti-Soviet propaganda, slander, subversion, etc. And the most crucial question is: What should be meant by "interests of the U. S. S. R. in areas as defined under the Yalta and Potsdam agreements"? What are "interests"? The Soviets understand this as full communization. This is obviously very different from our semantic of the word "interests."

I only know one thing, that the Soviets have their own ideas about "interests." Everything that is profitable to somebody while not bringing damage to others is in our opinion "the legitimate interest" of that person. The Soviet interpretation is different. The "legitimate" interests of the U. S. S. R., as the Soviets understand them, require that any agreement, any deal, and any measure taken by anybody be profitable and advantageous to the U. S. S. R., on the one side, and detrimental to another side, on the other hand. It is our principle to live and to let the others live, but the Leninist wisdom teaches: "Who will beat whom?"

Under such conditions, the prospects of reaching any sort of disarmament and inspection agreement with the Soviet Union are rather poor, and the world picture remains dark and gloomy. I would be very happy if the future developments show that I am absolutely wrong, but I am afraid my 40-year experience in Soviet affairs has not misled me.

Reply of Stefan T. Possony, Professor of International Politics, Georgetown University, March 7, 1957

The subject of disarmament obviously is of great importance to the security of the United States. It is a subject which has come up repeatedly during the last 60 years, and which will continue to arrest attention. On the whole the historical record shows that the various disarmament programs which were proposed and initiated in the past have operated to the detriment of the democratic nations. More specifically, unreasoned Western disarmament during the twenties and thirties was one of the prime conditions of World War II.

The record also shows that many of the specific disarmament or limitation of armaments concepts were faulty in design and not en-

forceable in practice. This particular remark refers to such ideas as the attempted outlawing of offensive as against defensive weapons, the establishment of international police forces, as well as to attempts of combining disarmament with collective security. The most carefully thought out security system—the Geneva Protocol of 1924—could not be made foolproof and it was not adopted because it would have all but destroyed national sovereignty. The more reliable a security system is from the technical-military point of view, the less compatible it is with the political system of the nation-state. For many reasons I doubt that the security situation could be changed fundamentally through the abolition of the nation-state structure, disregarding the fact that such a transformation could be accomplished only through war and probably never will be brought about deliberately by any government as a means of securing peace.

In previous years I devoted considerable study to disarmament. You will find many of the results at which I arrived, laid down in the book published by Professor Strausz-Hupe and myself, entitled "International Relations," McGraw-Hill, first edition, 1950, chapter XX, Armament, Disarmament, and National Security; chapter XXI, Atomic Bombs and Atomic Politics; chapter XXVI, Peace Enforcement; and chapter XXVII, Peace Enforcement: Prevention of War. (These last two chapters discuss the problem of international forces.) In a shortened version, and with added conclusions, these studies were rewritten for the second edition of the same book published during 1954, especially chapter 26, Waging the Peace. I call your attention to the subchapter called Peacefare: A Political Task, pages 719–726 of the second edition. You or your staff might find it useful to consult these writings.

I now will turn to your specific questions.

Question 1a:

> Are there grounds for believing that the leaders of the Soviet Union do recognize the threat of mutual annihilation created by the new weapons?

Answer: All powerful weapons of history could have been employed for mutual annihilation. Wars of mutual annihilation have taken place, for example during the 17th century, without benefit of nuclear explosives. That the new weapons have increased lethality exponentially is a fact of which the Soviets, of course, are fully aware. Your question implies, however, that the lethality of weapons has a clear-cut relationship to the possibility of mutual annihilation. While highly lethal weapons unquestionably can lead to annihilation, these two factors have many interrelationships. I do not think that the Soviets—who are no amateurs in military affairs—would think in the framework that is suggested by your question. They will recognize lethality and they will draw the conclusion that nuclear weapons must be used in such a way that Soviet strategic purposes will be achieved. Obviously, the annihilation of the Soviet Union is not one of their strategic purposes, but the annihilation of the United States is. In my judgment, the Soviets are aiming at a strategy of unilateral nuclear war. I explained some aspects of this concept in Air University Quarterly Review, Winter 1954–55, page 43, et seq.

Question 1b:

> To what extent, if at all, has this assumption entered into the formulation of policy and recent acts of the Soviet Union?

Answer: Since I do not believe that they make this assumption, the answer would be that their policy is influenced by the fear of mutual annihilation only to the extent that the Soviets exploit this fear, which is widespread in the United States and other free nations. They formulate policy partly in order to take advantage of the nuclear apprehensions prevalent in the West. The question also presupposes that the Soviets think and act as though they consider themselves to be the representatives of Russian national interests. Without entering into the merits of this hypothesis, I shall point out merely that an international organization, or conspiracy, is vulnerable in a different way from a nation. It may not be really vulnerable to atomic weapons.

Question 1c:

> What are the possibilities that the leaders of the Soviet, either now or in the foreseeable future, will recognize a mutuality of interest in preventing nuclear war and seriously seek agreement on control of weapons?

Answer: The Communists recognize that they have a great interest in preventing the United States from attacking the Soviet Union with its full power, but they do not by any means recognize that it is in their interest to preserve the United States from nuclear attack. The mutuality of interest to which your question addresses itself would be recognized by them only if they have concluded that under no circumstances will it be possible for them to achieve military surprise, technological and qualitative superiority, or the unilateral disarmament (or substantial reduction of armaments) of the United States. There never will be a situation where such a recognition can be made with assurance and for long (as distinguished from fleeting) periods. At any given time the Soviets may judge that their capabilities are inadequate for attack. At such a moment they will attempt, either to bluff the United States, or to persuade it to reduce armaments. Simultaneously, they will do everything in their power to acquire a situation of superiority. As time goes by, their chances to achieve a superior posture are increasing—they really should have been interested in disarmament in the past. Hence, I do not believe that they ever will recognize this presumed mutuality of interest.

However, this answer is predicated on the assumption that the intentions and structure of the Soviet Government, and the pressures upon the Soviet system and its decision making personalities, will remain substantially unchanged, and that Soviet technological capabilities will continue to grow, in both absolute and relative terms. If the Soviet Government should undergo significant transformations, and if the United States should pull ahead markedly in the technological race, the Soviet Union may seek some kind of provisional disarmament agreement. To the extent that some Communist "deviationist" group becomes influential, we may speculate that such a group might try to use disarmament mechanisms in order to make it more difficult for the aggressive wing of the Communist party to regain the upper hand.

In the absence of such changes—and there is no indication that the Soviet evolution has moved in any manner far enough to assume that such changes even are in the making—the Soviet Government will seriously sanction agreement on weapons control only if it has decided that (*a*) nuclear weapons are unnecessary or harmful to its strategy; (*b*) the control of nuclear weapons has becomes militarily pointless due to technological changes, such as space flight; (*c*) the controls which have been found acceptable can be circumvented by the Soviets in furtherance of their strategy, or could be employed as a suitable cover for surprise attack; and (*d*) other reasons with similar logic.

Question 2a:

> Given the present situation and the political structure of the Soviet Union, is there any possibility of reaching agreement opening the Soviet Union up to inspection?

Answer. No.

Question 2b:

> How far is it likely that the present Soviet leaders would go now in opening their country to inspection?

Answer. It is possible that the Soviets will allow a somewhat increased volume of personnel exchanges, including visits of scientists, military officers, newspapermen, and tourists. They will not, except by unlikely inadvertence or as a part of a deliberate program of exhibiting military strength, grant access to any installation or activity related to current or future military capabilities, let alone operations. It must be borne in mind that the secrecy mania is characteristic not only of the Communist regime, but has been for centuries one of the most outstanding character traits of Russia.

Question 2c:

> Under what circumstances might they be induced to go farther?

Answer. On a tit-for-tat basis they might allow visits to installations they otherwise would keep closed. Any such decisions would be made in the light of the then existing political situation, for a specific benefit, and would apply only to an individual case. In general, it can be assumed that if on a quid-pro-quo basis the Soviets were to grant broader concessions, they will have estimated that a greater advantage is accruing to them than to the United States.

Question 2d:

> If you believe any degree of inspection is unacceptable to the present Soviet regime, what kind of changes would have to come about in the U. S. S. R. or outside the Soviet Union before there would be willingness on the part of a Soviet Government to consider agreement involving such inspections?

Answer. Changes outside the Soviet Union presumably have no bearing, except if the Soviets would judge that foreign powers were getting ready to attack with weapons systems which the Soviet forces cannot intercept and against which they cannot retaliate. Changes inside the U. S. S. R. which would induce them to consider inspection were mentioned under 1c. In general, the answer must be, I sup-

pose, that Russia will have to get a democratic government, that this government must acquire a true and tested stability and that the orientation and habits of the Russian bureaucracy must change in direction of honest cooperation with foreign officials. It is not only the political system which is relevant to this problem, but also the mores of the nation. So long as the dictatorship lasts, the Soviets will not accept any broad inspection, because it would undermine the stability of the system. On the other hand, if there is a truly democratic government in Russia, the utility of an inspection system would be considerably reduced because, presumably, such a government would not be aggressive. I want to qualify the foregoing remarks by saying that of all types of inspection, aerial inspection is the one which would pose the least political danger to the survival of the Communist regime while, by contrast, it would be the least acceptable inspection method as long as they are toying with the idea of surprise attack. The capability to hold on to strictly military secrets is minimal against aerial inspection, but can be quite considerable against ground inspection.

Question 2e:

Can you envisage such changes occurring in the near or distant future?

Answer. I can envisage that the present rate of change within the Soviet Union will be accelerated, although this need not be the case. However, as the Soviet system is undergoing transformations, it will be especially careful not to expose itself to dangers that might arise from an inspection system (except as stated above that one of the groups fighting for power might consider that an inspection system would be helpful to them in their internal struggle). As these changes continue, they ultimately will culminate in a structural crisis and lead to the replacement of the Soviet Government. This is almost certain on the basis of historical precedent. It is less certain, of course, that all this will happen in the absence of war, that the direction of the change will be in line with our wishes, that the Soviet Government will be succeeded by a democratic government, and that this government can stay in power. Assuming that war can be avoided, the time parameters of such a historical development must be figured approximately as follows: 15 to 20 years, with a margin of error of about 10 years either way, before the Soviet system goes out of business. (The decline of the Czarist system lasted about 30 years, including about 5 war years.) Subsequently, at least 2 years will elapse before a democratic government can function properly, and perhaps an additional 5 to 10 years before this government will become stable and be accepted generally by the Russian people. In other words, the time parameter before an inspection system of a truly effective type (if it could be devised technically) can be instituted, may be estimated at 25 to 30 years. It should be added that by 1980 or 1990 military technology will be entirely different from what it is today, so that we may assume that at that time the inspection system we have in mind presently no longer would have the value it could have today, or no longer would be technologically applicable. In amplification of my time "estimate," let me say that historical processes in general have been accelerated during the 20th century. Sudden crises are possible

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at an early time and incidentally, may be accompanied by international conflict. The earliest time by which it is conceivable that a basic change will have occurred, would be within 10 years. Prudence dictates that a larger interval be anticipated.

Question 3a:

> To what extent would the present regime in the Soviet Union be willing to submit to and abide by such an enforcement agency?

Answer. The present regime? To no extent.

Question 3b:

> To what extent would any Soviet regime in the foreseeable future be willing to agree to such an enforcement agency?

Answer. Probably to no extent except as the enforcement agency might be used to the disadvantage of the United States. As long as there is a Soviet regime in Russia, no basic change can be anticipated. We can only have hopes in this matter—after all, Saulus became Paulus. However, a regime of the dictatorial type does not usually change. It must be replaced. The danger exists that the United States, in implementation of a disarmament agreement, might disarm at full speed but the Soviets would delay. It is conceivable that the Soviets would anticipate full American compliance with agreements. Therefore, they may calculate that an agreement through which the United States could be induced to disarm at a substantially faster rate than the Soviet Union, might offer them a most useful opportunity for attack.

Question 4a:

> Under what conditions would the Soviet Union be willing to withdraw its troops from Eastern Europe?

Answer. I believe that the Soviets do not want to withdraw troops from Eastern Europe under any conditions except that they would be willing to give up territory which, like Hangoe or Austria, is of little importance to them. Disregarding the question of whether or not there are Russian forces in the country, I believe that they might be willing, at some time, to give up Albania and conceivably Bulgaria. Poland would be the most unlikely country for them to abandon. We should not be overimpressed with the physical presence of Russian troops in a specific Eastern European country. The Communists might work some kind of an internal security arrangement through which, despite troop withdrawal, they would retain control over the satellite, as they have done in Czechoslovakia. It would follow then, that the significant question to ask is not whether or not they will withdraw troops, but whether they will withdraw troops plus allow the reestablishment of democratic government based on free elections, whether they would acquiesce in the downfall of the local Communist government, and whether they would permit liberated states to pursue an independent policy in every respect, including the participation in security agreements. (The significance of security agreements, of course, is that they would preclude the Soviets from reoccupying liberated states by means short of war.)

Question 4b:

> What is the likelihood of further developments in the direction of liberalization in the Eastern European countries and how might this affect the Soviet Union's readiness to consider the creation of a neutral belt through Europe or otherwise limit and control arms in a zone including the captive nations?

Answer. Further anti-Soviet developments in the satellite states are very likely, but it is as likely that the Soviets will intervene to prevent the overthrow of Communist governments. The situation in Eastern Europe probably will not follow one single direction, but for many years will display many ups and downs. If for one reason or the other, the Soviets feel that it is too costly, unproductive, impractical or militarily useless to maintain control over a satellite, they might negotiate an American quid pro quo for withdrawal. In general, the Soviets, due to their geographic proximity to Eastern and Central Europe, have less to lose from a "neutral belt" than the United States. Therefore, they can risk playing around with this idea, even though, in my opinion, they do not have the slightest intention of leaving. In the particular case of Germany, the significant question is not whether the Russian and American forces would be withdrawn in exchange of a German commitment to neutrality (which is another illusion), but whether the Soviets would tolerate the unification of Germany as a fully sovereign state which has complete freedom to develop and maintain its own defenses. The Soviets are all in favor of a Germany which they can reoccupy within 48 hours or bomb at will at even shorter notice, but they are opposed to a "neutral" Germany which could effectively defend itself against Soviet attack.

Question 4c:

> To what extent is the domination of the Soviet Union over the countries of Eastern Europe dependent upon the presence of the Red army within or near the borders of these nations?

Answer. Despite the fact that some of the satellites are not effectively occupied by Soviet forces, the Soviet Union maintains its power in Eastern Europe largely by military means. Since it is very difficult to overthrow a well-armed dictatorship, especially if it is supported from the outside, it could be argued that, despite the Hungarian example, communism can maintain itself in these states (except, probably in Eastern Germany) even after Soviet troop withdrawal. The situation might be different if it were clear that the Soviet military forces would not return. Moreover, the way by which the withdrawal is brought about would play a role. On balance, it can be said that the Soviets probably estimate that their military presence in at least some of the satellite countries, as well as easy military access to Eastern Europe, is an indispensable element of their rule over those nations, as well as a key factor in their overall strategic position.

Question 4d:

> How would a marked reduction of the size of Soviet forces or other kind of disarmament control affect Soviet influence over the Eastern European countries?

Answer. A marked reduction of the size of Soviet forces need not seriously weaken their hold over Eastern Europe. This depends in part on what type of forces they will retain. To the extent that, qualitatively and quantitatively, Soviet military strength really would be reduced and be limited as to its employment possibilities, the Soviet position over Eastern Europe would weaken. If such a reduction of military strength (not size) can be brought about by disarmament, armament limitation agreements would promote the liberation of Eastern Europe. I consider this a fanciful idea, however. The Soviets hardly will want to pay an excessive price for disarmament, and the elimination of communism from Eastern Europe would be an excessive price for them, especially since the event would have repercussions in Russia and also would be incompatible with the concept of world revolution. If in its ultimate consequences, disarmament would lead to the destruction of communism, can we seriously expect the Communists to agree to such a scheme?

Question 5a:

What comment do you have on Mr. Dulles' statement?

Answer. I think that Mr. Dulles has a point: everybody wants to be relieved from burdens. The question is: What priority will the Soviets assign to this imputed desire to save money on military expenditures? The record of the last 25 years is that they have constantly assigned highest priority to military preparedness. At the present time there is not one solitary fact which would indicate that this priority has ben changed or watered down. The Soviet mentality is not like the mentality of American businessmen, and it is conceivable that the Soviets, far from considering military expenditures as burdens, like the Prussians of previous centuries, regard military strength as their main and preferred industry. Military power can be a very considerable economic asset, and the Soviets are quite aware of this.

On the other hand, it is true that the Soviet economy is now entering a phase where some painful decisions must be made. They will have to raise, to a degree at least, living standards and there is clearly a conflict between current military expenditures, and investment and growth rates. The maintenance of a rapid growth rate is becoming militarily crucial since, due to technological developments, the Soviet strategic planners probably consider that the main conflict with the United States will take place only in the next or in a subsequent technological cycle. To the extent that by maintaining huge armaments now they may inhibit industrial growth, they could jeopardize their future technological posture. If this is their thinking, they might be willing to reduce current expenditures somewhat in order to strike a beter balance between present and future military requirements. If so, this would be a rearrangement of armament schedules, but not a change in priorities and certainly not an attempt to substitute foreign economic aid for a strategy based on military power. By the same token, it might not be in the true interest of the free world if we were to assist them, through armament limitation agreements, to solve one of their most difficult strategic problems.

Question 5b:

To what economic considerations, if any, can the announced Soviet troop reductions of 1,800,000 men be attributed?

Answer. There is a distinct manpower shortage in the Soviet Union—but how sure are we about the facts alleged in this question?

Question 5c:

> Is there anything in present Soviet economic trends that would indicate a need for relief from the present level of arms production?

Answer. Answered under 5a.

Question 5d:

> To what extent is the structure and adaptability of the Soviet economy such that it could make the adjustment required by an appreciable reduction in production of armaments with greater or less ease than that of the United States?

Answer. I believe the honest answer to this question is that no one really knows. It must be pointed out, however, that a centrally planned economy functions most effectively in the area of heavy and military industries, and that its performance is least satisfactory in those economic fields which require decentralization, flexibility, responsiveness to customers' desires, and large distribution mechanisms. As presently constituted, it is my belief that the Soviet economy cannot effectively adopt the satisfaction of consumers' needs as its primary objective. In any event, the vast buildup of light industries, transportation systems, and internal and external trade facilities would require a far-reaching reorganization of the entire Soviet society, in a manner which may be politically undesirable to the Soviet Government. Perhaps all this is feasible but such changes of the economic structure would require many years.

Question 5e:

> Are there any apparent difficulties involved in such a transition that might require the Soviet Union to go slow on any disarmament process?

Answer: If the Soviets were to switch from heavy industrial and armaments priority production, much more than a simple transition would be involved. It probaby would be unavoidable to reorganize the Soviet economy in a very fundamental manner. Whether this difficulty per se would be a reason to go slow on disarmament—assuming that, for strategic reasons, the Soviet Union desires to execute a disarmament program—can be answered only by speculation. To a large extent, the answer will depend on concrete circumstances, including domestic hazards which may arise in various forms. Naturally, if the economic reorganization should prove more difficult and time consuming than anticipated, the Soviet Government may have no choice but to slow down disarmament. It is only prudent to recognize that the Soviet Government has less freedom of action in this matter than the United States and that, therefore, any agreement with them contains uncertainty factors, even if we give them the benefit of doubt insofar as their intentions are concerned. I am not sure to what extent the Soviets are aware of the inherent limitations of their economic system and I do not think that their awareness on this point, if any, is very sophisticated. I do not believe that the

Soviets would ask themselves such a question before deciding on a disarmament policy, let alone that they would really try to get, objectively, to the bottom of this problem. I may take this opportunity to point out that in my estimation this entire set of questions does not address itself properly to the basic facts of Russian and Soviet psychology, but reflects American procedures and thought patterns.

Question 6a:

> What type of controls would be most workable and effective over the Soviet military establishment?

Answer: Aerial inspection would be an indispensable minimum. It must be supported by strong ground control units without limitations on access to any facility at any time. Moreover, no limitations must be placed on aerial reconnaissance operations, in particular no limitations as to frequencies of flight, altitude, equipment, and utilization of equipment, except to check airplanes as to whether they carry bombs.

Question 6b:

> What are the legitimate security interests of the Soviet Union which should be taken into account on disarmament planning?

Answer: The legitimate security interests of the Soviet Union are exactly the same as those of the United States. Any agreement must be based on full and unmitigated reciprocity as to the rights, procedures, and operations of the mutual control establishments.

In conclusion I would like to say a few words about my own philosophy on the inspection proposal. The emergence of a mature air inspection capability is a new fact which has changed disarmament problems to the better. In previous times it was quite impossible to keep track of a country's armaments if that country wanted to prepare itself secretly. Henceforth a proper aerial inspection system could make it extremely difficult for any country to carry out clandestine armaments on a substantial scale or to put it differently, the existence of an aerial inspection system would render clandestine armaments very costly and hazardous. It is, therefore, advisable to explore all the technical problems which must be solved in order to improve the reliability of aerial inspection. It also is politically wise to keep the world informed about the fact that a technical instrument for mutual military supervision has become available. There is no reason to be pessimistic about the purely technical aspects of the problem and certainly, no reason not to try to take full advantage of an existing capability which if it were used properly, could reduce the danger of full-fledged war. In my opinion, the United States was well advised to present these facts to the world and to invite the Soviet Government to explore methods by which this new technology could be utilized to mutual advantage.

On the other hand, it is unlikely that aerial inspection by itself can be developed into a fully reliable instrument. So far as I understand the problem, there is no question but that aerial inspection will have to be supplemented by elaborate ground and communications systems. This means that states will have to maintain extensive facilities and

large operating units on the territories of other states where they will be checking up on major activities of the foreign government. Consequently, no government could remain master in its own house. Thus, the establishment of an effective and reliable inspection system which includes, and also is responsive to the entire game of modern technology, can be undertaken only if the principles of national sovereignty are abandoned. Moreover, as technology changes, the inspection system would have to be readjusted frequently which, of course, might open up various possibilities of foul play. Another difficulty would be that such an inspection system might all but destroy the workings of an industrial economy based on competition.

Whether these various prices should or should not be paid for an inspection system is a philosophical matter. A person who considers the maintenance of peace to be the overriding objective of all political action probably will be ready to pay any price. Others who are aware of the rapidly changing nature of modern technology and impressed by human ingenuity may well argue that even under best conditions, inspection systems can be reliable only for interim periods, and therefore would not be worth the effort, despite the high utility of peace. I merely want to stress that the adoption of a truly reliable inspection system presupposes very fundamental changes of the governmental and political structures of the participating nations. These changes really require social transformation or revolution, and must be so radical that they may well be beyond the capability of governmental decisions but can result only, if they will occur at all, from protracted historical processses.

In the absence of a capability to institute a fully reliable inspection system, the question arises whether we should be satisfied with less and settle, for example, for purely aerial inspection. I believe that, unfortunately, the discussion about inspection systems has been connected improperly with the disarmament issue. Under conditions of limited reliability, an inspection system that may be politically and socially feasible, can do one job: reduce but not eliminate the danger of surprise attack.

I consider such a prospect sufficiently attractive so that we should not abandon our efforts to achieve some progress toward mutual aerial inspection. I have no illusions about Soviet willingness to contribute to human welfare. Our efforts in the cause of true peace should not be made conditional on Soviet cooperation, just as little as the preaching of religious and ethical truths should be made conditional upon the assent of people professing antireligious beliefs and of persons indulging in unethical practices. The law exists irrespective of its "acceptance" by the criminal. The United States was entirely right when it disclosed, and emphasized, that a new technology has become available which could be exploited for security. The world must know this technical fact which, too, exists irrespective of its popularity in the Soviet Union. It is to our advantage to make the world realize that, while the United States is ready to act upon the new technology, the Soviet Union is not so inclined.

However, we must guard against our own confusions. A reduction in the capability of achieving nuclear surprise naturally may reduce the probability of war, but war still would remain entirely practical,

hence possible and therefore we must remain ready to defend ourselves. Since the danger of surprise attack only can be reduced but not eliminated, it would follow that, unless we take undue risks, military preparedness must continue to be the foundation of national security. To the extent that conventional military expenditures are needed in order to deal with the threat of surprise attack, such expenditures could be reduced in proportion to the diminution of the possibility of surprise attack, except that the cost price of modern weapons and operations continues to rise, with the result that such savings—which would be the only ones which could be made with impunity—will not allow us to reverse the upward trend of defense budgets.

I believe that at present only limited progress can be made at best. I certainly would look with favor on any progress, yet we never must forget that this progress has a considerable price tag attached to it. Disregarding the political and social costs involved, the inspection system in itself will be a costly operation. If we try to economize on inspection, it will become ineffective or, to turn this argument around, the greater our investment in inspection, the more we can rely on the system within its technical and practical limitations. For all these reasons, I consider it inadmissible to argue that the adoption of an inspection system could lead to reductions rather than increases in security expenditures; at this stage to tie the inspection program to disarmament or limitation of armaments problems; to expect from inspection that it can do more than reduce the danger of surprise attack; and to foster the illusion that aerial—or any inspection system—can be relied upon to eliminate war. Good things cannot be improved by overburdening. Mankind will be satisfied by the limited achievement of lessening the threat of nuclear surprise attack.

Reply of John S. Reshetar, Jr., Staff Member of the Foreign Policy Research Institute of the University of Pennsylvania and Visiting Lecturer in Political Science at Yale University, January 14, 1957

1. There is a small amount of evidence which indicates that there is some awareness within the Soviet ruling circle regarding the horrendous destructive power of modern thermonuclear weapons. This was contained in a statement which was included in a preelection address delivered by Georgi M. Malenkov on March 12, 1954. On that occasion, in the course of attacking the "policy of the cold war," the then Soviet Premier made the following statement:[1]

> It is untrue that humanity is limited to a choice between two possibilities: either a new world war or the so-called cold war. Peoples are vitally interested in a firm strengthening of peace. The Soviet Government stands for the further weakening of international tensions, for a stable and protracted peace, and resolutely opposes the policy of the cold war because this policy is the policy of preparing a new world slaughter which, with the contemporary means of warfare, means the destruction of world civilization.

However, this revealing statement should not be taken out of context. Malenkov was specifically attributing the "cold war" to United States

[1] Pravda, March 13, 1954.

foreign policy and may have been more interested in painting the alleged possible long-range results of this policy in the starkest of colors rather than honestly coming to grips with the problem of international control of nuclear weapons. It should also be noted that Malenkov called for a "stable and protracted peace" rather than for a lasting or permanent peace or the creation of conditions which would mean genuine banning of these weapons by establishing the necessary supranational machinery. Yet Malenkov's statement was followed by the publication in the March 26, 1954, issue of the Soviet military newspaper Red Star of a detailed article in which the construction of a hydrogen bomb and the effect of its explosion were described.

However, this approach was abandoned within 6 weeks at the U. S. S. R. Supreme Soviet session in April 1954. N. S. Khrushchev, speaking on April 26, 1954, revived the earlier line which had been so evident at the 19th Party Congress in October 1952. Khrushchev expressed it in the following terms:[2]

> The lessons of history are impossible to forget. And these lessons state that World War I led to the victory of the Socialist revolution in our country. * * * As a result of World War II a series of countries of Europe and Asia fell away from the capitalist system, peoples who irrevocably set out on the path of Socialist development. * * * If the imperialists attempt to loose a new war, it will inevitably end with the crash of the whole capitalist system.

Significantly, Malenkov followed suit by warning that:[3]

> if * * * the aggressive circles, trusting in the atomic bomb, were to decide on lunacy and would want to test the strength and might of the Soviet Union—there can be no doubt that the aggressor will be crushed with that same weapon and that such adventure will lead to the collapse of the capitalist social system (stormy, prolonged applause). It is precisely of this that the lessons of history graphically testify as related to the First and Second World Wars from which capitalism emerged with a significant shrinking of the spheres of its domination. Everyone knows that as a result of two world wars already more than a third of humanity has forever broken with capitalism.

When Malenkov was compelled to resign the premiership in February 1955, V. M. Molotov, then Foreign Minister of the U. S. S. R., declared in an obvious reprimand of Malenkov that:

> It is not "world civilization" that will perish, however much it may suffer from new aggression, but the decaying social system of which bloodthirsty imperialism is the core.[4]

However, a somewhat more sober view was evident in the joint communique of December 13, 1955, issued by Soviet Premier N. A. Bulganin, Party Secretary N. S. Khrushchev, and Indian Prime Minister Jawaharlal Nehru. That document included a statement regarding the

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[2] N. S. Khrushchev, Rech' na pervoi sessii verkhovnovo soveta SSSR, chetvertovo sozyva, 26 apreiya 1954 goda (Moscow: Gosizdat Politlit, 1954), p. 16.
[3] Pravda, April 27, 1954.
[4] Pravda, February 9, 1955.

> futility of war which, owing to the development of nuclear and thermonuclear weapons, could only bring disaster to mankind.[5]

Nevertheless, these statements, followed by Khrushchev's assertion at the 20th Party Congress on February 14, 1956, that

> capitalism will find its grave in a new world war * * * the Socialist camp is invincible—[6]

do not provide great reassurance regarding the Soviet rulers' intentions or their recognition of the danger involved. Yet there are the several statements cited above which do indicate a certain level of awareness of the threat of mutual annihilation. The disturbing element in the Soviet picture derives from the "lessons of history" alluded to above and from the fact that World War II, whatever its cost to the Soviet Union, did enhance the Soviet power position immeasurably.

Now it can be argued, and with some validity, that each of the above statements was calculated in terms of a particular desired effect which it was designed to create, and therefore the extreme assertions regarding the destruction of "capitalism" as a result of World War III need not be taken as more than calculated threats. In other words, the Soviet assertion that World War III will end in Communist domination of the globe is not in itself, it is argued by some, a guarantee that the Soviets desire World War III. However, it cannot be denied at the same time that the statements of Soviet leaders quoted above are of a disquieting nature and hardly testify to the ability of the Soviet leaders to grasp the seriousness of the problem.

Yet it may be that the Soviet ruling circle does "recognize a mutuality of interest in preventing nuclear war" but this interest does not, from their point of view, outweigh other interests. For example, the Soviet rulers assert that they have no intention of employing these weapons unless attacked but propose that they be banned without proper safeguards and under conditions palpably unacceptable to the democracies. It would appear that there are more immediate interests which have prompted the Soviet rulers to take this position; among these are the need to have an external threat—whether real or imagined is irrelevant for their purposes—which can be denounced and can be employed to exact sacrifices from the subject populations and to facilitate generally the control which the regime exercises over these populations. The Soviet rulers have a real interest in the continued existence of a controlled tension between the democracies and the Communist bloc. Indeed, in internal affairs the Soviet rulers have, in a variety of ways, institutionalized tensions so as to reduce their subjects to pliable instruments. Any really effective system of international controls would, in effect, render the Soviet system of internal political controls ineffective because it would liquidate the tension which is a sine qua non of that system.

2. Genuine inspection by an international agency—which would really have to be a supranational body—would require that the representatives of this agency not be restricted to certain points, however "large" and "important" they may be, as provided in the Soviet proposal of May 10, 1955, and in Premier Bulganin's statement of July 21,

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[5] New York Times, December 14, 1955.
[6] Komsomolskaya Pravda, February 15, 1956, p. 3.

1955, at the Geneva Conference; they must ultimately have complete freedom of movement and access at will to any military installation and industrial enterprise. Such a system of inspection would, in effect, undermine the internal system of political controls essential to the perpetuation of the present regime, given the particular mental stereotypes of its leaders.

The record of Soviet behavior indicates that the presence of any alien non-Soviet bodies on Soviet territory has been a cause for some concern and the activities of such bodies have been restricted. For example, the UNRRA mission in the Ukrainian S. S. R. following World War II, although it had to be tolerated because of the economic aid which it brought, was restricted in many ways and its representatives did not always enjoy real freedom of movement. It is difficult to conceive of a Soviet Government permitting the fulfillment of a genuine plan of inspection.

President Eisenhower's bold aerial inspection plan, first proposed at the Geneva Conference on July 21, 1955, can be regarded as something less than a full and adequate inspection system, although as an initial effort for a more comprehensive plan it merited serious consideration from the Soviet rulers; yet it was rejected by Premier Bulganin on September 19, 1955, and on February 1, 1956. While the Bulganin proposal of November 17, 1956, admits of the possibility of the Soviet Union's agreeing to aerial inspection to a depth of at the most 500 miles (800 kilometers) on each side of the line along which the troops of NATO and of the Warsaw Pact signatories are presently disposed, this Soviet counterproposal had the disadvantage of not opening up the heartland of the Soviet military base to inspection while at the same time throwing open the heart of Western Europe to such inspection.

3. The acceptance of any kind of enforcement agency by the Soviet rulers is unlikely so long as they continue to place stress, as they have so far, upon national sovereignty in their brand of international law and rationalize, by means of the domestic jurisdiction and internal affairs argument, actions which have been condemned by the United Nations General Assembly. The Soviet proposal of May 10, 1955, was vague on the point of enforcement confining itself to the following statement:

> The control [inspection] agency makes recommendations to the Security Council on measures of prevention and suppression as regards violators of the convention on reduction of armaments and prohibition of atomic weapons.[7]

This provision follows logically from the Soviet view of the United Nations, expressed from the moment of its founding, that that organization is based upon the principle of the unanimity of the permanent members of the Security Council. Thus the Soviet view implies that the Soviet Union as a great power cannot really be held to account and cannot have sanctions imposed upon it without its consent. Acceptance of an enforcement agency by the Soviet rulers would involve radical revision of their views on international law and organization.

(4) The conditions which the Soviet Union would probably desire as the price for the ultimate withdrawal of its military forces from

[7] New York Times, May 12, 1955.

the East European States which are now signatories to the Warsaw Pact are the following:

(*a*) Recognition by the West of the East German Soviet regime, the so-called German Democratic Republic, as a coequal in negotiations between that regime and the German Federal Republic. This would mean abandonment of the basic condition of all-German free elections demanded by the democracies since the commencement of serious negotiations on German reunification.

(*b*) Abandonment by the United States of all or the greater part of its bases in Western Europe (and possibly in north Africa as well).

(*c*) The conclusion of a nonaggression pact between NATO and the Warsaw Pact—a condition specifically mentioned in Premier Bulganin's letter of November 17, 1956, to President Eisenhower.

The question of whether or not the United States and its West European allies could accept such conditions goes beyond the bounds of this paper.

The presence of Soviet troops in Eastern Europe is so closely related to the German problem that the former cannot be discussed without reference to the latter. The Soviet rulers apparently cannot accept the principle of all-German free elections since it would probably lead to the establishment of an all-German government in which the Communists would be in a minority. Thus it is preferable, from the Soviet point of view, to place the blame for the perpetuation of the partition of Germany on the "remilitarization" of the German Federal Republic and on the establishment of NATO. Unless the Soviet ruling circle were to agree to lose all of Germany, it has little alternative but the profess to favor reunification while in fact favoring continued partition on the assumption that part of Germany under Soviet military occupation is preferable to a reunited Germany which would either be neutral or a member of NATO. While the Soviet Union appeared to have been willing to accept a reunited neutral and partly remilitarized Germany in its unusual note of March 10, 1952, it is doubtful whether that proposal will be revived. The Soviet Union's present insistence upon western recognition of the East German Communist regime appears to be a relatively fixed principle of its German policy. When diplomatic relations were established between the German Federal Republic and the Soviet Union in September 1955, N. S. Khrushchev asserted that a reunited Germany could not be permitted to enter NATO, and he recounted how the Soviet Union had requested entry into NATO (on March 31, 1954) and had been refused because, according to Khrushchev, NATO is directed against the Soviet Union and the East European Communist regimes. Khrushchev stated the matter bluntly when he declared:

> If the German Federal Republic joined NATO and the German Democratic Republic does not participate in NATO, we would be fools if we were to concur in all of Germany's entering NATO and in that way strengthen the forces directed against us.[8]

[8] Pravda, September 12, 1955.

Khrushchev went on the declare to Chancellor Adenauer in connection with the German Federal Republic's refusal to recognize the East German Soviet regime:

> I do not demand that you agree with me. I know full well that you will not agree with this. But the German Democratic Republic is the future. It is the future not only of the German people. Marx Engels spoke of this future.[9]

Less than 1 week later, Premier Bulganin, in playing host to the representatives of the East German Communist regime, declared that—

> The difficulties which the German Democratic Republic is encountering are difficulties of growth. It should be said that in its time the Soviet people lived through incomparably greater difficulties. We were alone, against us there was the whole capitalist world. The German Democratic Republic is not alone.[10]

This uncompromising Soviet position regarding the East German Communist regime was restated by Khrushchev at the 20th party congress when he asserted that:

> The German Democratic Republic, which is opposed to war, has gained in strength to such an extent that today it is no longer possible to speak of a solution of the German problem without its participation or at the expense of its interests.[11]

This position was repeated in the Soviet note of October 23, 1956, to the German Federal Republic. Significantly, this note referred to the Soviet losses in World War II and declared that "all this cannot be forgotten."

Thus, Soviet policy toward Germany is prompted by fear and suspicion as well as by obduracy. The unrest which manifested itself in the states of Eastern Europe during the latter half of 1956 has probably reinforced this attitude and the Soviet view that troops must continue to be stationed both in Germany and on the territory of signatories of the Warsaw Pact.

5. There is little doubt that the Soviet Union, given its very high rate of capital investment, has been experiencing a labor shortage in industry as well as the need to resettle thousands of young unmarried persons on the newly cultivated "virgin and fallow lands" of Kazakhstan and Siberia in accordance with Khrushchev's agricultural policies. The planned reduction of Soviet armed forces by 1,200,000 men by May 1, 1957, in addition to a cut of 640,000 which was supposed to have taken place between August 1955 and February 1956, can be explained, if they are taking place, in terms of the general Soviet manpower shortage and the disproportionate sex ratio of the Soviet population. It should also be recalled that there is a shortage of men in their midtwenties as well as of boys aged 13–15 in the Soviet Union as a result of the decline in natality which occurred during the 1932–33 famine and during World War II. This has meant, in the former case, that some troops have had to be kept in

[9] Ibid.
[10] Pravda, September 17, 1955.
[11] Komsomolskaya Pravda, February 15, 1956, p. 3.

military service longer than would have ordinarily been the case. Of course, we are not told by the Soviet rulers what the exact size of their armed forces will be following these announced reductions. Another factor which may have prompted such reductions is the announced completion of the motorization and mechanization of the Soviet Army, according to Defense Minister Zhukov's statement at the 20th party congress.[12]

Announced cuts in the Soviet military budget must be regarded with considerable caution, since the prices of military goods in an economy of the Soviet type are artificial. In any case, the trend has probably been away from an army in which sheer manpower has been the predominant factor toward a mechanized force relying more upon advanced weapons than was the case previously.

REPLY OF PROF. N. S. TIMASHEFF, DEPARTMENT OF POLITICAL PHILOSOPHY AND THE SOCIAL SCIENCES, FORDHAM UNIVERSITY, JANUARY 6, 1957

1. There are reasons to believe that the leaders of the Soviet Union are aware of the possibility of mutual annihilation by nuclear weapons. The doctrine to which they adhere emphasizes technical achievements, and throughout the years they have discussed the situation in terms of technological competition between the United States and the U. S. S. R. They have able and well informed experts to consult, and it seems that, since Stalin's death, these experts are no longer scared to tell the leaders what they think about the situation.

The awareness of the danger and perhaps the inferiority of the U. S. S. R. relative to nuclear weapons has evidently contributed to many policy decisions of the Soviet leaders. Their noninterference with the Berlin airlift, their declaration of neutrality at the beginning of the Korean war, and their threat to send volunteers (not the regular air force) to Egypt are salient instances. But Shepilov's simultaneous ultimatum to England and France which, if disregarded, could have resulted in global war shows that there is a limit beyond which the Soviet leaders would not retreat. There is no doubt that if NATO forces would have entered Hungary to help her people win against communism, the reaction of the Soviets would have been A- and H-bomb attack against the United States.

There is one point which deserves special attention. We speak of the Soviet leaders, but we do not know exactly who they are; in other words, who participate in policymaking on the highest level. Neither do we know the relative weight of the opinions of the participants. It is, however, known that the real power center does not coincide with any institution, for example, the Presidium of the Central Committee of the Communist Party. It seems that the so-called collective leadership is a dynamic equilibrium of 10 or 12 persons whose grouping into factions and relative influence is subject to continuous change. Under these conditions, the predictability of the decisions which might be conducive to the outbreak of a third world war is very low indeed.

In any case, it would be very imprudent to take it for granted that, recognizing the dangers of modern warfare, the Soviet leaders alto-

[12] Pravda, February 20, 1956.

gether preclude war as a possible means of achieving their goals. There is, moreover, no process going on which would indicate a favorable change of attitudes—so long as the structure and the personal composition of the ruling circle remains approximately what it is today.

2–3. This does not, however, mean that the Soviet leaders would reject any agreement eradicating nuclear warfare, provided that they could preserve their superiority as to conventional weapons. But, because of the many peculiarities of their social and political structure, they never would agree to an unlimited inspection, on the part of the U. N. or of a special international body. The type of inspection they would allow can be easily imagined by analogy with the inspection of the troop movements and transportation of military equipment after the Korean truce; it is obvious that it would be inefficient and unreliable.

Further concessions on the part of the Soviet leaders could be expected only if, on the basis of convincing reports of experts, they would come to the conclusion that the relationship of military strength was changing against them. Such an eventuality could occur only if, in the United States or the allied nations, new spectacular inventions were made, not duplicated by similar inventions in the U. S. S. R., or if, in the Soviet Union, it would become inevitable to allocate a much higher portion of the national resources to the satisfaction of consumers' needs. At the present time, a certain lift of the standard of living of the Soviet population seems possible without slowing down the production of munitions and military equipment. All that would be necessary would be slowing down the rate of acceleration of armament production. Since the United States is not inclined to raise its expenditure on armament, such a policy on the part of the Soviets would keep stable the equilibrium between the two camps and still let the people have more than they do. This was the Malenkov plan (announced in August 1953 and carried out through 1954 but abandoned early in 1955). In the December 1956 resolutions of the Central Committee of the Communist Party one can perhaps find some signs of the intention to return to the plan.

Of course, the pressure on the part of the population could become stronger and stronger, so that the limited improvements on the basis of the policy sketched above would no longer suffice. The existence of widespread dissatisfaction engendering such a pressure is undeniable. It is manifested in the efforts of the Soviet leaders to appease the population by mitigating the system of organized terrorism and by achieving "Socialist legality" (without granting the people real rights enforcible by independent courts). A number of decrees to this end have been enacted during the past 2 years and the same preoccupation appears in some recent writings of such persons as the Prosecutor General of the Soviet Union. The plan of appeasement through concessions on "the legal front" was, curiously, the Beria plan and seems to have been partly adopted now. As it always happens under similar circumstances, a controversy is going on among the Soviet leaders—whether such concessions would really appease the people, or would only incite them to demand more concessions. If the latter idea wins, and no further concessions on the legal front are made, more economic concessions will become necessary, and,

indirectly, this would make the Soviet leaders more inclined to discuss and even seek an agreement on the control of armaments.

4. Until recently, one could assume that the Soviet leaders would be willing to withdraw their troops from Eastern Europe provided that the Americans and British "go home." The latest events in Poland and Hungary have demonstrated that, without direct support of Soviet troops, the puppet regimes in the satellites would fall. Of course, the Soviets could withdraw their troops and concentrate them just behind their borders; the distances are small, and a satellite nation overthrowing its Communist government could be invaded in no time. But the Hungarian events, without having inflicted a mortal blow on communism (as is sometimes stated), have been a serious warning and have cost the Soviet Government a good deal of friendly attitudes among the nations which recently gained independence.

In consequence, today one can hardly expect that a deal concerning the withdrawal of troops from the satellites and the NATO countries of the European Continent could be arranged. By the same token, the plan of creating a neutral zone in central and east central Europe must be considered quite unrealistic. Very conclusive is the reaction of the Soviet leaders to the demand of neutrality on the part of the leaders of the Hungarian revolution: the countries of the Warsaw pact were told that they could not be allowed to part company.

As to the liberalization of East European countries, among the Soivet leaders this idea is as controversial as the idea of legal appeasement within. The inconsistent management of the Polish and Hungarian problems by these leaders proves this beyond doubt. Most probably, the antagonists of further liberalization will win: it is apparent that, concessions or no concessions, the peoples of the satellites will not become willing and wholehearted allies of the Soviet Union. The concessions granted to the Poles may stay, at least for a while; but their expansion through the area of the captive nations is improbable. The Soviet leaders will know the principle divide et impera and will not commit the blunder of creating a zone of semi-independent states which, perhaps under Tito's leadership, could amalgamate into a union with the point against the U. S. S. R.

5. The question raised by Secretary of State Dulles has been partly answered under 2–3. The Soviet Union could allocate more labor force and material to the production of food and consumers' goods by letting the armament production stay on the present level.

There is, on the other hand, no reason to believe that the Soviet economy would meet great difficulties in reducing armament production and simultaneously increasing the production of consumers' goods. Of course, the Soviet economic system is cumbersome and burocratic; but, on the other hand, no problems concerning private interests and profits arise. One has again to emphasize that the problem of reconversion could be solved by allocating to light industry all or almost all the increase of productive capacity foreseen by the 5-year plan for given years. But it is doubtful whether the Soviet leaders are ready to do so.

6. I do not see any type of control of the Soviet military establishment which would be both effective and acceptable to the Soviet leaders.

As to the legitimate security interests of the Soviet Union, one must take in consideration that, throughout history, not only Russia but the

majority of European states were open to invasion. Attempts to create security zones beyond the boundaries of a state have always resulted in overexpansion and final collapse. For instance, Napoleon created around France a belt of satellites extending up to the Russian boundary; but finally he decided that so long as Russia remained independent, he was not safe, and launched the war of 1812 which resulted in the downfall of his empire. Especially under the present conditions of warfare, the security of the Soviet Union could be guaranteed only by expanding its boundaries up to the Atlantic Ocean and the Mediterranean. And even then it would be exposed to an eventual attack by American superbombers. So, today, complete security coincides with world dominance. The corollary is: in disarmament planning, no regard can be paid to the particularistic interests or ideas of the individual nations on security.

REPLY OF ADM. B. ULAM, ASSOCIATE PROFESSOR OF GOVERNMENT, RUSSIAN RESEARCH CENTER, HARVARD UNIVERSITY, DECEMBER 20, 1956

Before replying to the specific questions in your letter of December 7, 1956, I would like to state a few facts as I see them about the Soviet Union at this particular point in history. Ever since Stalin's death Soviet Russia has been in a state of political flux. It is almost certain that there will be considerable changes in Russian society and in the present setup of her Government within the next 2 or 3 years. This state of flux makes any statements about the Soviet Union highly hypothetical.

1. Although I am not qualified to comment on the purely scientific and technical aspects of the questions, I am entirely convinced that the rulers of Russia are fully aware of the vast destructive potentialities of the new weapons. Soviet foreign policy has for some time been geared to the idea of avoiding an all-out war, though I must add that in my opinion Soviet Russia would not have risked, except under extreme circumstances, a worldwide war at any time since the end of World War II. The development of the H-bomb has undoubtedly heightened their desire to avoid an all-out war.

At the same time, it must be recognized that under the circumstances of dictatorship whether by one person or a group of persons, there is always a possibility that the regime, in order to avoid a complete political defeat or a certain loss of political power by the ruling elite, may have recourse to steps which would precipitate a world conflict and in turn bring about a situation where the use of nuclear weapons would become necessary. Thus the possibility is not excluded, though highly unlikely, that in an extreme situation and under circumstances which would give them at least a small chance of total victory by surprise the rulers of Russia would use the ultimate weapon.

2. Under present circumstances I am dubious about the possibility of any agreement under which the Russians would honestly agree to any thorough workable system of inspection which would open their country to inspection which would mean, in a sense, supervision by an international agency. I can see in the near future no possibility of any probable Russian regime agreeing to a thorough inspection, and I believe no agreement would be enforceable. I just cannot see

the Soviet Union opening its industry and territory to a large number of foreign observers and complying 100 percent with any such setup.

3. My answer to question 2 is relevant to the question you pose here.

4. I believe that the problems you ask under 4 are much more practical, and offer a more fruitful basis for bargaining with the Russians than any of the problems considered under the first three questions. It is not inconceivable that under certain conditions, like the withdrawal of American troops from Western Europe or the abandonment of the remilitarization of Germany, the Russians would agree to the withdrawal of their troops from the present satellites. I think changes are very strong that in the long run social, economic, and political forces in Eastern Europe would make the present satellites a drag rather than of advantage to the Soviet Union. Their domination by Russia has from the beginning been enforced laregly, if not completely, by the presence of the Red army troops or the threat of the Red army.

The type of development which has been going on in Poland cannot but reduce Russia's influence there and also remove whatever hopes the Russian command may have had concerning the reliability of the Polish Army in a crisis. I think that the Polish development is not unique and with a reduction of the size of Soviet forces, Soviet influence, in terms of actual control, over their satellites is likely to "wither away." There are a few qualifications to the above statement: thus the Russians have obviously hoped to compensate for their diminishing physical control over the satellites by establishing stronger ideological and self-interest bonds. I am not worried about the strength of ideological bonds, for in my opinion they are not likely to prove to be the decisive factor in retaining those countries allegiance to the Soviet Union. On the other hand, the U. S. S. R. may play such angles as economic help and capitalize, e. g., on the fact that up to now she alone of the Great Powers has supported Poland's frontier with Germany. All in all, barring the unexpected, Russian influence over the European satellites is bound to diminish in the long run.

5. It is quite possible that in view of the swollen state of the armed forces and their progress in developing nuclear weapons, the Soviets might have decided that it was entirely feasible even militarily to reduce their forces and yet not to endanger their military potential. From the economic point of view, with the Soviet masses crying for consumer goods, any reduction on such a scale redounds to the economic advantage of the U. S. S. R. I see no major difficulties for a totalitarian system like the Russian to absorb any amount of released army men into their economy.

6. The only effective controls for the time being, when you have to deal with a totalitarian system, are the type of controls which would be self-enforceable and the violation of which would be immediately detected, for example, physical removal of Russian troops from Eastern Europe and Eastern Germany and (if this be technically possible and desirable to us) prohibition of nuclear tests.

As to the legitimate security interests of the Soviet Union, the question is rather hard to answer since in the eyes of the rulers of the U. S. S. R. their "legitimate" interests include absolute military superiority on the Continent and their domination of the satellites. In my

opinion the minimum security interests which the Russians would be willing to accept, and that after a lot of hard bargaining, would be the security of their 1945 frontiers and the demilitarization of the region extending from those frontiers to the western sphere of interests.

In general I believe that the Russians do not think of disarmament as an isolated subject but in connection with their whole international and even internal situation. Thus, disarmament in a real sense would come only as a part of a general international settlement preceded by the Russians' realization of (*a*) that the Western Powers are determined and capable of not tolerating any further Soviet expansion, either direct or indirect, and (*b*) that the West has no intention, once its legitimate interests of self-protection are satisfied, of attempting by force to damage or destroy the legitimate interests of the Soviet Union, that is, physical security of Russia within her present frontiers.

Reply of Bertram D. Wolfe, Writer on Soviet Affairs
December 17, 1956

1. The leaders of the Soviet Union are set on winning the world for their system, and their dogma teaches them that the ultimate victory of communism is "scientifically demonstrated and inevitable." This does not allow room in their day-to-day thinking for the idea that mankind may destroy itself utterly. Their dogma teaches them that not mankind but capitalism will be destroyed in a future war, or by limited and partial wars and struggles and gradual erosion. As recently as on their visit to England during the past year they threatened their hosts in public banquet speeches with the few minutes that would elapse between the launching of rockets and supersonic bombers from their bases and the destruction of England. Of all their public utterances on this question only one that I know of (that of Malenkov) spoke of the possible destruction of mankind without regard to class or system, and that was later specifically repudiated by Molotov, and impliedly by Khrushchev and Bulganin. That they are willing to destroy an entire economy and a people in order to make their system prevail is now being demonstrated in Hungary. The "system" has come to mean to them not a certain level of productivity or well-being but a total statification of industry, agriculture, political power, culture, force, a total control best designated as totalitarianism. This can prevail in a ruined country as well as one with a going economy—at least that is their outlook, and as far as we can judge by their actions, in the war for the victory of their system they can take economic ruin and mass annihilation in their stride.

2. If they have private second thoughts on this matter, they hide them from their own consciousness, and especially from each other, for it would be a sign of "softness," of unfitness for Communist leadership, a sign of a willingness to consider questions "classlessly," involving an agreement to permit the dying capitalist system to live indefinitely in defiance of the "laws of science and history."

3. In their peace campaigns and peace societies in the free world, they are delighted to spread the idea that the use of atomic weapons, or, indeed, the breakout of a general war, would mean the destruction of mankind. This is a species of valuable blackmail in their eyes, for if the free world lets them cut to pieces first Hungary, then perhaps Poland, or Germany, penetrate and take control of the Middle

East, and is afraid to draw the line anywhere lest that might entail all-out war and "the end of civilization as we know it," then they can continue to feel out the weak spots, nibble off piece by piece, conquer and slaughter single peoples, enlarge their controlled area through little wars, civil wars, "punitive expeditions to prevent the recurrence of fascism," etc., and thus further the "historical process" unhindered by anything more than resolutions and protests. And even these will gradually diminish, for neighbors like Finland, knowing that they are unprotected, will prefer to abstain from protest lest they too be locally "rescued from fascism and reaction."

4. They cannot allow free inspection of their world by our inspectors, or of our world by their people, and that for two reasons:

> First, the myth of the superiority of their system is maintained only by not letting the free world get a good look at how it works, and not letting their people get a good look at the rest of the world.
>
> Second, a land which makes even economic facts into state secrets and is dotted with concentration camps and secretive preparations for war cannot permit general inspection.

Yet, if our nerves grow weak, if our negotiators tire of endless repetition of the few elementary things we must forever repeat, then we will settle for pseudoinspection, and be deceived, and deserve to be deceived.

They do not get tired of repetition, nor of finding new dress for the same old proposals. If we are eager not to prove intractable, they will consider it a sign of the weakness of a doomed order, and take advantage of it. Our negotiations from Yalta to Potsdam, and in the tents of Panmunjom, should have taught us that. We have to make up our minds on a few fundamentals: Is the insistence on a safe, genuine, enduring peace worth clinging to, no matter if it takes decades and as yet unforeseen occurrences before it is realized? Or shall we settle for a false peace, under the cover of which the drive for world conquest is relentlessly continued? Is "disarmament," without as foolproof an inspection system as can be devised, not a snare to be avoided as a plague?

5. To remain forever on guard as long as there is danger may seem intolerable, but its only alternative is to be off guard. It is fashionable to talk of the "lessening of tension," tension being a word with bad connotations of which they are quick to take advantage. But if we translate the word "tension" out of their jargon into its real meaning—"concern"—then it becomes clear that we must cling to our concern (cling to our "tension") as long as there is good reason to be concerned, with the fate of peoples and of freedom. What our negotiators need is clear heads, steady nerves, an ability to distinguish between fundamentals and the trivia of protocol and face, and to cling, for weeks, for months, for years, for decades if necessary, to those fundamentals.

6. Actually, their system is not as mighty as it looks for it involves unending war on their own people as well as an unending effort to win the world. Even the death of a dictator weakens this inhuman "monolith" as East Germany, Pilsen, Vorkuta, Poznan, Warsaw, and Budapest have shown. Our task is to make forever clear that we know how to distinguish between the enslaved peoples and their rulers,

for they are the first victims of the totalitarian Communist system. In our negotiations with the tyrant it is necessary always to watch that we do not strengthen his hand against his domestic victims. You ask what changes are necessary in the Soviet system before we can make genuine agreements of peace as against the present on-guard agreements to try to avoid war. I can only answer: When the rulers of the totalist state make peace with their own peoples, then and then only will they be able to make peace with other peoples. But that involves a tolerance of man's diversity and right to freedom which is alien to their dogma and their system. Poland and Hungary, no less than Korea and the Berlin airlift, show that they tolerate what they are forced to tolerate, and only as far as they think they are forced to tolerate it.

7. In the proposal to withdraw part and later all of our troops from Western Europe in return for the Russian withdrawal of part and later all of their troops from their satellites, there is a double trap. On the one hand, our withdrawal would be overseas and theirs only a few hundred land miles. On the other, they have already shown in their negotiations with Hungary how swiftly they will ignore any promise if their power is threatened. If the satellites could be held down by puppet armies alone (an impossibility) they would keep out their troops. But if not, they would send them back in a matter of hours, or use auxiliary troops of one satellite against another.

8. Finally, I wish to make part of this letter an analysis of the Soviet Army Manpower Reduction and Reduction Promises, which I did first for Life magazine, then for the Research Institute of America, and finally, in its simplest and most complete form, for the New Leader. It is important that it be made part of the record in considering the matter of manpower cuts.

I should also like to call the attention of the subcommittee to my 7-minute presentation on the subject of Peaceful Coexistence in a symposium with Harry Schwarz of the New York Times, Arthur Schlesinger of Harvard, et al., under the chairmanship of Senator Neuberger (on file with the subcommittee), and to my remarks on peace and peaceful coexistence on pages 10, 12, 44–48, and 83 of my recent book entitled "Krushchev and Stalin's Ghost."

(Following is the article referred to: "Why Russia Had To Cut Its Armies," by Bertram D. Wolfe, The New Leader, June 25, 1956:)

Why Russia Had To Cut Its Armies

FIVE-YEAR MANPOWER SHORTAGE NOW LOOMS AS RESULT OF WAR'S LOW BIRTHRATE

(By Bertram D. Wolfe)

The Kremlin recently announced that love of peace was impelling it to cut its armed forces next year by 1.2 million men; that is, by approximately one-third. To date, the comments of the leaders of the free world on this announcement have been defensive and confused. "It's only a promise for the future. * * * How do we know they will really do it? * * * It is belated, since we cut our armies below that scale immediately after the war. * * * Mass wave tactics are out of date anyhow, and fewer men with better equipment make a more

powerful armed force. * * * We have no way of checking and controlling the cut. * * *"

All these comments are sound, but they miss the main point. That point is: *The Soviet Union is being compelled to cut its armed forces for demographic reasons, not love of peace. And the same demographic reasons will compel it to make even more drastic cuts in each of the next 3 years.*

A careful student of Soviet population trends could have predicted the first cut, as we can predict at least three more. As a matter of fact, basing myself on the same population-trend figures, I last year outlined the reasons for a cut in the concentration camp population as well as the armed forces. (See my Six Keys to the Soviet System, pp. 146–147.)

In the Harvard Review of Economics and Statistics for May 1954, Dr. Naum Jasny, a leading expert on Soviet agriculture, published population tables which make it inexcusable that our country's leaders should have failed to predict the cuts or to know how to explain them. Those who do not read statistical journals could have found Dr. Jasny's figures in brief and simplified form in the Russian-language journal, Socialist Courier. Here are the facts once more, as clearly and simply set down as they can be—

> The shortage in industry: Each of the 5-year plans has one-sidedly expanded Soviet industry, especially heavy industry and war industry. Each expansion has called for an increase in the number employed in industry.
>
> The shortage in agriculture: Throughout the history of Russia, there has been an excess population in the countryside. Thus, when industry expanded, it could always get fresh recruits from the villages.

Under the last two czars, as under Stalin, industry expanded with enormous rapidity. Under Nicholas II the expansion was less one-sided but no less astoundingly rapid than under Stalin. And, under both, the secrets of the rapid expansion of industry were (1) the borrowing of advanced techniques and machinery from older industrial countries, and (2) the drawing of fresh labor force from the surplus population of the villages. If there was yet a third secret, it was the rapid birthrate.

But under the fifth 5-year plan (the one that has just ended) the unexpected occurred: *For the first time in all the history of Russia, there is now a shortage of manpower in agriculture.* Since 1954, it has been necessary for Khrushchev to send young people not from the village to the city, but from the city to the village.

How explain this reversal of the age-old historical trend? Again, the answer is painfully simple:

> The Soviet system has been wasteful, even reckless, with human life. The forced collectivization, the liquidation of the independent peasants as a class, the state-made famine, the life-destroying concentration-camp system, the pact with Hitler which unleashed World War II, the mass-wave tactics of fighting battles—each of these took its toll of Russia's "limitless" human resources.
>
> The use of coercion in place of generous distribution of the fruits of their toil has made the workers' productivity per capita

much lower than that of any other land with modern machinery.

Collectivization has taken the heart of out the peasants, so that they barely produce enough to keep body and soul together. Whatever surplus they produced above their animal needs is taken by the state at confiscatory, token prices. They are reduced to spiritless state serfs.

The figures in agriculture are eloquent. In Russia with its multitude of tractors and combines (perhaps the most highly mechanized agriculture in the world), it takes approximately 50 percent of the working population to feed and provide hides and fibers for the other 50 percent, for those in the cities, in the swollen bureauracy and in the swollen army. One out of every two producers is in agriculture, yet there is a perpetual shortage of meat, butter, milk, grain, hides, cotton, and wool.

In the United States, only about 10 percent of the total productive force of the country is in agriculture—10 percent can feed and clothe the other 90 percent. Though only 1 out of 10 is a farmer, our farms still produce too much wheat, too much corn, too much cotton, and too much wool.

Keeping in mind these facts, that industry, agriculture, and the army are all straining the manpower resources of Russia to the utmost, let us look at Dr. Jasny's table. The latter, after consulting with 2 demographic experts, the late Eugene Kulischer and Warren Eason, drew up a table of the increase in working force to be expected by normal population growth during each of the 10 years from 1950 to 1960. He arrived at each year's figures by taking the birthrate of 16 years earlier (youths reach a working age at 16) and subtracting from this the rate of diminution of the working force by death, old age, illness, youths not gainfully employed, and similar causes. The net difference between new youths entering employment at 16 and older workers dropping out gives the annual figures shown below for increase in the working force:

1950	1,300,000	1954	2,500,000
1951	1,300,000	1955	2,400,000
1952	1,600,000	1956	2,100,000
1953	2,600,000		

At this point, let us note that the last 4 years have been exceptionally fat years. The war had ended, and the war ruin had been restored. Demobilization had increased the working force. And the babies born in the years 1937–40 were reaching the age of 16.

Those had been relatively good birth years between two periods of nightmare. In the early thirties, births had diminished and infantile mortality had shot up because of the famine, the liquidation of the peasants as a class, the forced collectivization, the concentration-camp deportations. Then life became "brighter." Stalin promised every kolkhoznik a private plot and a cow. He killed mostly Communists in the blood purge, charging them with "wrecking" and other responsibility for the miseries of the early thirties. The ordinary mass of people was let alone. Births increased. More children survived infancy and reached 16. Therefore, 1954, 1955, and 1956 were the fat years in which roughly 2.5 million were added each year to the net working population.

But in 1941 disaster struck again. Late in June, Hitler double-crossed his partner and attacked Russia. The birthrate fell rapidly in the second half of that year, and infant mortality rose. And each year thereafter, 1942, 1943, 1944, the number of births dropped further and the number of child deaths rose. Therefore, returning to the table, we are now dealing with years in which the numbers reaching 16 are fantastically diminished. After deducting those dropping out of the labor force, we get net increases not of 2 or 2.5 million, but:

1957 (born, 1941)	1,800,000
1958 (born, 1942)	800,000
1959 (born, 1943)	300,000
1960 (born, 1944)	300,000

Isn't it clear that not love of peace but a simple shortage in the working force is compelling the cut of 1957 and will compel still larger cuts in 1958, 1959, and 1960? How can Khrushchev maintain, not to mention increase, his lagging agricultural output without sending some young men from the cities? How can he continue the "priority of heavy industry" and the expansion of the complex new war industries without taking men from the army? The Kremlin must either abandon its plans for the sixth 5-year plan in industry and agriculture or else cut its armies and concentration-camp populations. Or, which is not unlikely, both at once.

Dr. Jasny's table does not go beyond 1960. But is it hard to see that the young men reaching 16 in 1960 will be of military age in 1962? This is less than an eighth of the increase of the fat years to satisfy the demands of swollen armies, depleted and lagging agriculture, and topheavy large-scale industry. When Stalin did not like the census figures, he killed the census takers as "wreckers." But no killing of census takers will alter these facts.

None of this will prevent the Kremlin from making a virtue out of this dire necessity and trying to use their compulsory cuts for propaganda purposes. But the least we can expect of our experts and our leaders is that they make clear to themselves and to a listening world that not sudden love of peace but the bitter facts of biology, of demographic statistics whose gyrations in Russia so often spring from political acts, are forcing the Kremlin to reduce its swollen armies from year to year.

DISARMAMENT AND SECURITY IN EASTERN AND SOUTHERN ASIA

STAFF STUDY NO. 9

JULY 1957

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PREFACE

By Senator Hubert H. Humphrey, Chairman

The security of the free nations of eastern and southern Asia rests upon many factors—economic, political, and military. In every one of these categories concrete steps toward disarmament can have a salutary impact. Many of the Asian states, because of the possibility of Communist aggression, must maintain military and police forces which constitute a heavy burden upon their near subsistence economies. Thus, any headway that can be made toward lifting the weight of Asian armed forces and armaments can free resources for strengthening the material foundations of their liberty and independence. Steps toward disarmament can also lighten the heavy economic burdens of the people of the United States and other countries and enable them to channel more of their energies into constructive measures for peace.

Many of the Asian peoples are at a political crossroads, hoping that the atomic age will bring them peace and plenty rather than misery and destruction. Thus, as pointed out in this study, they have a deep dread of the further development of atomic explosives, a dread that has been intensified by the holding of nuclear tests in regions relatively close—Siberia and the Pacific Ocean. Any initiative by the United States that can ameliorate this dread should make a profound impression on the Asian people. While promoting throughout the world the peaceful uses of atomic energy, we should strenuously endeavor to prevent the spread of nuclear-weapon capability to nations not now possessing it, for this would multiply manifold the chances of an outbreak of a nuclear war. The three present nuclear powers—the United States, the Soviet Union, and Great Britain—cannot expect, however, other nations to deny themselves the military instruments of an atomic age unless they themselves are willing to curb their own development and testing of nuclear explosives. The benefits that all nations, both great and small, would derive from a general limitation on nuclear arms development would be so far-reaching that no nation can now afford to ignore the possibility of such an agreement.

Unsolved political problems are also contributing causes of the arms burdens sustained by both the Communist and the non-Communist states in Asia. The problem of Communist China, after being stalled on dead center for half a dozen years, is now approaching a decisive juncture. The issue of political prisoners, on which negotiations between the United States and Red China have been deadlocked for many months at Geneva, is slowly melting away as the prisoners are gradually released. At this time six are still being held. Surely the rulers in Peiping should realize that release of those imprisoned would help to lessen tensions in the area. The release of these Americans should open the gate to negotiations on other differences, the resolution of which would help dissipate ill-afforded arms burdens now weighing upon Red China, the nations of south and southeastern Asia, as well as other countries.

New forces are astir on the Chinese mainland that indicate the political situation may be evolving toward greater independence of action and less adherence to Soviet domination. While I do not think these developments should be exaggerated, nevertheless in my estimation the time has come to take a fresh look at our policy toward Peiping.

We should certainly encourage American newsmen to visit Red China in order to report what is happening in that country and to enable news about the United States to penetrate through the bamboo curtain to the Chinese people. We should consider modifying other barriers, such as the trade embargo, which force China into ever closer relations with the Soviet bloc. Finally, it is essential that Communist China be brought into any disarmament system at an early stage. As long as there are no armament controls on Communist China, that country will be free to continue to strengthen its large military machine. Moreover, until Communist China is included in a disarmament system, it will provide a loophole which the Soviet Union might use to violate obligations undertaken as a result of a disarmament agreement.

Another urgent question in eastern Asia today, as indicated in this study, is that of Korea. Here is another example where the lack of a political settlement results in the maintenance of large armies, separated only by a narrow demilitarized zone. The armistice negotiated in 1953 has become extremely tenuous because violations by the Communists have necessitated the suspension of key provisions on arms control. Only recently the United Nations Command announced that, in view of the reinforcement of North Korean forces, modern weapons would be sent to the United Nations forces in South Korea.

The danger of an arms competition between North and South Korea has convinced me that we should now take a further step. Before the armistice agreement breaks down entirely, we should amend the agreement to make it conform with the latest trends in United Nations disarmament negotiations. The United Nations Command should be authorized to offer to negotiate with the Communist command new military arrangements providing for a thinning out of armed forces and armaments on both sides of the armistice lines and for effective mutual inspection. This study gives ample evidence that the past inspection system in Korea has been woefully inadequate. However, with mutual aerial and ground inspection of the type that both the United States and the Soviet Union have already accepted in principle we would know whether a new limitation on armaments was being observed. Such an agreement would ameliorate a dangerous situation in Korea and perhaps pave the way for a political settlement. It would also provide an excellent pilot area for mutual air and ground inspection. Such a pilot project might also be applied to Vietnam, which may work to facilitate a political settlement of problems afflicting that divided nation.

It is my belief that Staff Study No. 9 on Disarmament and Security in Eastern and Southern Asia is a valuable aid in understanding the complex problems of disarmament and security. It was prepared by Ellen C. Collier and Charles Gellner, on assignment to the subcommittee staff by the Legislative Reference Service of the Library of Congress. It does not necessarily reflect the views of the Disarmament Subcommittee or any of its members.

JULY 8, 1957.

DISARMAMENT AND SECURITY IN EASTERN AND SOUTHERN ASIA

A. Background

Security in the Far East after World War I [1]

Not long after the First World War a period of relaxation seemed to settle over the Far East. Great power rivalries in the area had been resolved into fairly well-defined areas of influence, and since most of the countries in the area were colonial dependencies of the great powers they too benefited from the prevailing security balance. India (present-day India, Pakistan, and Ceylon), Burma, and Malaya were part of the British Empire. Indochina belonged to France, the East Indies to the Netherlands, and the Philippines to the United States. Farther north, Korea and Formosa were under Japanese sovereignty. China, although an independent republic, to some extent was dependent for its freedom upon guaranties of the nations with interests in the area through such policies as the "open door." [2] Japan, Siam (presently Thailand), and Afghanistan were also independent. Japan alone, however, was a strong military and industrial nation and able to compete with western nations for power in the area.

One factor in the stabilization of the Far East in the post World War I period was an agreement among the leading powers with interests in the area to limit their naval armaments. The Washington Conference of 1921–22 was primarily concerned with security in the Far East because the naval competition which existed between the United Kingdom, the United States, and Japan at the end of the First World War was arousing concern that there might be war in the Western Pacific. Several agreements affecting the Far East were negotiated by the major powers. The Treaty on Limitation of Naval Armaments established ceilings on the tonnage of capital ships of the United States, the United Kingdom, Japan, Italy, and France in the ratio of 5–5–3–1.75–1.75.[3] Moreover, in the treaty the United States, the United Kingdom, and Japan agreed that the status quo with regard to fortifications and naval bases should be maintained in their insular possessions in the Western Pacific.[4]

In another agreement—the Four-Power Treaty—the United Kingdom, France, Japan, and the United States agreed to respect each other's rights in the Pacific and to refer future disputes in that area to a joint conference. Finally, in the Nine-Power Treaty these states

[1] This section is based upon a report by J. Clement Lapp, Foreign Affairs Division, Legislative Reference Service, Library of Congress.

[2] The "open door" policy was set forth by United States Secretary of State John Hay in notes of 1899 and 1900, and included recognition of the territorial integrity of China and the obligation of each power not to discriminate in favor of the commerce of its own nationals in its sphere of influence.

[3] For the text, see United States Senate Committee on Foreign Relations, Subcommittee on Disarmament. Disarmament and Security, A Collection of Documents, 1919–55 (hereinafter referred to as Collection of Documents) p. 13.

[4] Japan was already obligated not to fortify the Pacific Islands it had received as mandates from the League of Nations following World War I.

plus Italy, Belgium, China, Portugal, and the Netherlands, bound themselves to respect the "sovereignty, the independence, and the territorial and administrative integrity of China" and to uphold the principle of the "open door." These agreements aided in reducing tension in the area for almost a decade.[5]

The Second World War

In 1931, however, Japan launched a series of aggressive actions, beginning with the conquest of Manchuria, which were not successfully countered by the other powers with interests in the area. Japan withdrew from the League of Nations and in 1935 denounced the Washington Naval Treaty. There was suspicion that, contrary to international commitments, fortification of Japan's mandated islands was underway. This suspicion was strengthened by Japanese refusals to permit League of Nations inspections or to permit the United States to send naval vessels into the ports of the mandated islands.[6]

China again became the victim of Japanese aggression in 1937 when the latter invaded the former in an undeclared war. Japan's attack on Pearl Harbor brought the Second World War to the Far East. The power of Japan enveloped successively the China littoral, Hainan Island, Indochina, Thailand, Burma, Malaya, Indonesia, the Philippines, and the South Pacific Islands to the very doorsteps of Australia and New Zealand before Japanese military dominance and expansion in the Far East were brought to an end.

With the formal surrender of Japan on September 2, 1945, the United States and its allies had vast land, sea, and air forces in the western Pacific area. The Soviet Union, which had declared war against Japan on August 8, 1945, had forces in Korea north of the 38th parallel, and in the Sakhalin and Kurile Islands. On the China mainland the position of the National Government headed by Chiang Kai-shek was threatened by Communist forces led by Mao Tse-tung.[7]

Emergence of new states

The end of the war brought a surge of nationalism throughout Asia which resulted in independence for most of the peoples of the former colonies. The Philippines, Burma, India, Pakistan, and Ceylon gained sovereignty without involving hostilities with the mother country. In Indonesia, however, bloodshed marked the transition to full independence. In Indochina the full independence of Vietnam, Laos and Cambodia was achieved only after the harsh pains of 8 years of warfare with Communist-led insurgents and even then the end of hostilities left Vietnam north of the 17th parallel under Communist control, as was the case in Korea north of the 38th parallel.

The demilitarization of Japan

The prewar pattern was further changed by the demilitarization of Japan and its relinquishment of Formosa, the Ryukyu Islands,

[5] The naval limitation agreement was supplemented by the London Treaty of 1930 which set an upper limit in all categories of vessels for the United Kingdom, the United States and Japan, with a 10-10-6 ratio in capital ships and heavy cruisers, a 10-10-7 ratio in light cruisers and other auxiliary craft, and parity in submarines. The treaty also had an escalator clause which released a signatory from its obligations if its position was jeopardized by the naval construction of a nonsignatory. Collection of Documents, p. 41.

[6] Wilds, Thomas. How Japan Fortified the Mandated Islands, U. S. Naval Institute Proceedings, April 1955: 401–407. According to this article, later evidence showed that the bulk of the military installations in these islands were built in 1940 and 1941, that is, after the expiration of the treaty in 1936.

[7] Since 1926 the armies of the National Government had been pitted against the Chinese Communist forces. Dating from Japan's conquest of Manchuria in 1931 the military power of the National Government had faced two enemies, the Chinese Communists based in China's northwest hinterland and Japan pressing southward from Manchuria.

Korea, southern Sakhalin, the Kuriles, the Bonins, and the Pacific mandated islands (the Marshalls, Carolines, and Marianas).

The basic post-surrender policy for Japan [8] stipulated that Japan could not have any army, navy, airforce, secret police organization, or any civil aviation or gendarmerie. All military equipment was seized or destroyed. In its new constitution of November 3, 1947, Japan renounced war as a sovereign right and forbade the establishment of an army, navy, and airforce.[9]

The rise of the Communist threat

Although the Soviet Union withdrew its forces from Manchuria in 1946 and from North Korea in 1948, Communists were left in control of these areas, and throughout Asia Soviet agents endeavored to influence nationalist, labor, peasant, and other popular movements. In 1948 the Chinese Communists launched a successful counter-offensive against the nationalists and the next year conquered the entire mainland. The Nationalist Government and army retreated to the island of Taiwan (Formosa).

The Communist drive for power in Asia became even more pronounced when on June 25, 1950, North Korean Communist forces attacked the Republic of Korea. At the end of the year, after the United Nations effort had repulsed the Communist forces, a large army from Communist China joined in the aggression. Communist China also showed its desire for expansion by marching into Tibet.

In 1946 the Communist-led Vietminh forces in Vietnam had launched a full-scale war against the French and French-allied nationalists. The war was not brought to an end until the Geneva armistice of 1954 which provided for the division of Vietnam into a Communist-controlled north and a non-Communist south. The Chinese Reds then moved to force the Republic of China to surrender Taiwan and the Pescadores Islands but this attempt was unsuccessful.

Communist power has also threatened tne security of other nations in the western Pacific area. The exact nature of the threat has varied from country to country and with the changing world situation. Recently the Communist plan of moving with military force into areas of military weakness has shifted to an increasing emphasis upon economic, political, and cultural penetration.

B. Security Systems in Asia

The Communist onslaught against South Korea in 1950 marked the beginning of intense efforts by the United States and other countries to reinforce their security through cooperative defensive measures. In Korea the aggression was turned back by the United States and 15 other countries, both Asian and non-Asian, in a collective defense action under the aegis of the United Nations. Elsewhere in Asia the United States sought to deter Communist aggression by building situations of strength through formal alliances and through expanded programs of military and economic aid.

[8] U. S. Department of State. Activities of the Far Eastern Commission. Report by the Secretary General. Washington, U. S. Government Printing Office, 1947.

[9] Article 9 of the constitution reads: "Aspiring sincerely to an international peace based on justice and order, the Japanese people forever renounce war as a sovereign right of the nation and the threat of use of arms as means of settling international disputes.

"In order to accomplish the aim of the preceding paragraph, land, sea, and air forces, as well as other war potential will never be maintained. The right of belligerency of the state will not be recognized." Collection of Documents, p. 581.

The Japanese peace settlement and associated security pacts

The victory of the Chinese Communist forces in 1949 and the Korean aggression of 1950 focused attention on the need to normalize the status of occupied Japan. Principally through the initiative of the United States, a general peace settlement for Japan was negotiated consisting of a peace treaty and a series of security pacts with Japan and other Pacific countries. In the peace treaty signed at San Francisco on September 8, 1951, Japanese sovereignty was restored and the occupation was terminated.[10] Pursuant to a bilateral security treaty signed at the same time, the Japanese Government granted the United States the right to station troops in Japan on a provisional basis until the latter could assume responsibility for its own defense.[11]

In conjunction with the negotiations on the Japanese peace and security treaties the United States also drew up defense pacts with Australia and New Zealand, and with the Philippine Republic. These treaties were motivated in part by a desire to give the signatory Pacific countries assurances of security at a time when Japan's sovereign right to have its own defense forces was being restored.[12]

In terminology both of these security treaties were directed at aggression from any quarter. In each treaty the signatory states pledged to consult whenever their territorial integrity, political independence, or security was threatened in the Pacific,[13] and if an armed attack was made, each would consider it "dangerous to its own peace and safety" and declared that it would act to meet the common danger "in accordance with its constitutional processes." [14]

Alliances with the Republics of Korea and China

The armistice between the United Nations Command and the Communist armed forces in Korea in mid-1953 [15] put an end to the fighting, but large Communist forces remained entrenched north of the armistice line. To stiffen the defense of the Republic of Korea (South Korea) the United States concluded a mutual defense treaty with it on October 1, 1953.[16] In it each party recognized that an attack in the Pacific area on territory under the administrative control of either of them would be dangerous to its peace and safety, and promised that it would act to meet the common danger in accordance with its constitutional processes. The Korean Republic granted the United States the right to keep military forces on its territory.

The present security problem of the Republic of China arose when the Chinese Communists took over governmental power in continental China in late 1949 and the National Government withdrew to Taiwan. The President of the United States, in January 1950 as the

[10] Partial text in Collection of Documents, pp. 602–606.

[11] Text in ibid., pp. 606–607. The United States and Japan subsequently concluded an administrative agreement governing terms on which bases and other facilities would be granted to the American forces. Text in Department of State Bulletin, March 10, 1952, pp. 382–390.

[12] The Philippine Treaty was signed August 30, 1951, and that with Australia and New Zealand, September 1, 1951. The report of the U. S. Senate Foreign Relations Committee stated in regard to the pact with Australia and New Zealand: "As a result of World War II, these countries feared the resurgence of Japanese aggression, and they were deeply concerned about the possibility of Japanese rearmament. Their natural inclination, therefore, was to think in terms of a peace treaty that would make such eventualities impossible. They could agree to a generous treaty, imposing no restrictions upon Japanese rearmament, only if the United States would formally express concern for their security and agree to stand with them in the event of an attack." Collection of Documents, p. 939.

[13] The Philippine Treaty specified consultation when the threat was from "external armed attack" in the Pacific.

[14] Texts in Collection of Documents, pp. 598–601. The treaty with Australia and New Zealand provided for the establishment of a Council of Foreign Ministers to consider matters for the implementation of the treaty. A similar council was created in May 1954 under the United States treaty with the Philippines.

[15] July 27, 1953. Partial text of armistice agreement in Collection of Documents, pp. 396–405.

[16] Text in ibid., pp. 607–608.

civil war between the Communists and the Nationalists continued, announced that the United States would not pursue a course leading to involvement in China and thus would not provide military aid or advice to the Nationalist forces on Taiwan.[17] But 6 months later when the Communists attacked in Korea, American policy toward Taiwan was altered. The President then announced that "the occupation of Formosa would be a direct threat to the security of the Pacific area and to the United States forces. * * *" and he ordered the United States Seventh Fleet to prevent any attack on the Nationalist-held island. As a corollary he declared that he had called upon the National Government to cease military operations against the mainland. "The 7th Fleet will see that this is done," he declared.[18] Three years later this policy was amended when the President announced that the 7th Fleet would no longer be used to "shield" Communist China.[19] The order to defend Taiwan, however, was not reversed.

The defense commitments of the United States regarding Taiwan were formally expressed in a mutual defense treaty with the National Government signed December 2, 1954. The treaty contained a security guaranty clause similar to those in the other security pacts mentioned above.[20] It applied to those territories in the Western Pacific under the jurisdiction of the United States and, with respect to China, to Taiwan and the Pescadores (small islands in the Formosa Strait). Other territories could be included "as may be determined by mutual agreement." In an exchange of notes between the United States and Nationalist China [21] it was affirmed that the use of force for the defense of Taiwan and other territories would be a "matter for joint agreement," except, however, for "action of an emergency character which is clearly an exercise of the inherent right of self-defense." This exchange was widely interpreted as blocking Nationalist offensive measures against Communist territory without the concurrence of the United States.

Early in 1955 the so-called "Formosa Resolution" approved by Congress authorized the President at his discretion to use American military forces to defend "related positions and territories" required for assuring the defense of Taiwan and the Pescadores.[22] This resolution, it was generally agreed in Congress and elsewhere, permitted the President at his discretion to defend Nationalist-held islands, other than Taiwan and the Pescadores, along the East China coast, which had been under intense military pressure from the Communist mainland.[23] The "Formosa Resolution" was a unilateral expression of intent and was distinct from the formal commitment to Nationalist China in the mutual defense treaty.

[17] The President said, "In the view of the United States Government, the resources on Formosa are adequate to enable them to obtain the items which they might consider necessary for the defense of the island." In: Raymond Dennett and Robert K. Turner. Documents on American Foreign Relations, 1950. Princeton University Press (for World Peace Foundation), 1951, pp. 492-495.

[18] Proclamation of June 27, 1950. Dennett and Turner, op. cit., pp. 444-445.

[19] State of the Union Message of President Dwight D. Eisenhower, February 2, 1953;

[20] Text in Collection of Documents, pp. 608-610.

[21] December 10, 1954. Texts in U. S. Senate Foreign Relations Committee, Mutual Defense Treaty with the Republic of China. Report * * * February 8, 1955 (84th Cong., 1st sess., Executive Report No. 2), Washington, 1955, pp. 10-11.

[22] Text in Collection of Documents, pp. 966-967.

[23] The "offshore" islands most discussed were Quemoy and Matsu. The resolution, however, mentioned no specific islands. Although a recent source indicated that President Eisenhower gave President Chiang Kai-shek of the National Government his "personal assurance" regarding the defense of Quemoy and Matsu (John R. Beal, John Foster Dulles: A Biography, New York, Harper & Bros., 1957, p. 227), Secretary Dulles has stated that the United States made no commitments to defend the offshore islands beyond the actual wording of the congressional resolution. New York Times, April 3, 1957, p. 8.

Multilateral security in the Pacific: The SEATO Pact

After the outbreak of the Korean conflict advocates in the United States and elsewhere [24] increasingly urged the formation of an all-Pacific security pact similar to the North Atlantic Treaty or the Rio Treaty in the Western Hemisphere. This aim in principle was adopted as official policy by the United States Government and the security treaties with the Philippines, Korea, Australia, and New Zealand had clauses looking toward the development of a "more comprehensive system of regional security in the Pacific Area." [25]

The Geneva armistice agreement of July 20, 1954, ending hostilities in Indochina but leaving the Communists in control of North Vietnam and two northern provinces of Laos, and maneuvers by Communist China in support of subversive activity in Southeast Asia, spurred negotiations on a multilateral treaty for the defense of the Southeast Asian region. Some southern Asian states, however, such as India and Indonesia, were not willing to commit themselves to a military alliance and the three Indochinese countries, Laos, Cambodia, and Vietnam were hindered by the Geneva armistice agreement from participating in such an alliance.[26]

The eight countries that signed the Southeast Asia Collective Defense Treaty (now generally referred to as SEATO—Southeast Asia Treaty Organization) [27] at Manila on September 8, 1954, were Pakistan, the Philippines, Thailand, Australia, New Zealand, Great Britain, France, and the United States. Each signatory pledged, in case of attack against any of them to "act to meet the common danger in accordance with its constitutional processes." The terms of the treaty were directed against aggression in general, but in an understanding incorporated in the pact the United States limited its commitment to act only against aggression by Communists. It promised to consult in case of other aggression. The other signatories did not thus limit their commitment.

Subversion and guerrilla attack were considered dangerous possibilities in Southeast Asia and the SEATO signatories provided to act against them through a stipulation in the treaty that, if the territorial integrity or political independence of a party covered by the pact was threatened in some way other than armed attack, the parties would consult on measures to be taken for the common defense.

The Manila pact applies to the "general area of Southeast Asia, including * * * the entire territories of the Asian parties, and the general area of the Southwest Pacific" up to a line running just north of the Philippine Islands. Taiwan, Hong Kong, and other areas to the north are thus excluded from the jurisdiction of the treaty.[28] The treaty stipulates, however, that armed aggression against any state or territory outside the treaty area might by unanimous agreement of

[24] The National Government of China, the Republic of Korea, and the Philippines called for a Pacific pact. William Reitzel, Morton A. Kaplan, and Constance G. Coblenz, United States Foreign Policy, 1945–55. Washington, Brookings Institution, 1956, p. 311. (Cited hereafter as "Brookings.")

[25] The U. S. Congress has formally endorsed the creation of a regional security organization in the Far East and Pacific area. See secs. 101 and 105 of the Mutual Security Act of 1954, as amended. U. S. Senate Special Committee to Study the Foreign Aid Program. The Military Assistance Program of the United States, Washington. 1957, pp. 160–161.

[26] The 1954 Geneva agreements on ending hostilities in Indochina stipulated that the Indochinese states should not enter alliances except under certain conditions. See art. 19 of the armistice agreement for Vietnam; and declarations by the Royal Governments of Laos and Cambodia, in Senator Mike Mansfield's report on Indochina * * *, October 15, 1954 (printed for the use of the Senate Committee on Foreign Relations), Washington, 1954, pp. 21, 28–29. Although South Vietnam did not sign the armistice agreement and considers itself not legally bound by it, as a matter of policy South Vietnam has not entered into a military alliance.

[27] Text in Collection of Documents, p. 611 ff.

[28] See map, opposite p. 464.

the signatories be recognized as coming under the security guaranty clauses of the treaty.

A separate protocol to the SEATO pact specifically includes within the guaranty of the treaty the nonmember states of Cambodia, Laos, and the Republic of Vietnam. Although Cambodia and Laos have rejected SEATO's protection, the commitments of the treaty members are not contingent upon acceptance by the two countries.[29] But by the terms of the treaty [30] no defensive action on the territory of these states could be taken without their consent.

To carry out the terms of the treaty an organization has been established with headquarters at Bangkok, headed by a Council of Foreign Ministers. SEATO does not have a military command and a joint defense system such as that possessed by NATO, but there is joint military planning.

Other western security responsibilities in southern Asia

The United Kingdom exercises sovereign powers over Hong Kong, Singapore, and the Malay Federation, and thus is directly responsible for their defense.[31] Malaya is now in an interim stage looking toward independence within the Commonwealth on August 31, 1957. At the time self-government is conferred Malaya will provide military bases for British forces, including the Commonwealth strategic reserve.[32] The number of British troops in Malaya, however, will be reduced.[33] Singapore, too, is in a transitional stage toward self-government but Great Britain will continue to have responsibility for the external defense of the territory.[34]

Great Britain has no direct treaty commitment to come to the military defense of Japan, Korea, or Taiwan, but it has joined SEATO to which it is contributing forces based in Malaya and Singapore. In addition, Commonwealth ties with India, Pakistan, Ceylon, Australia, and New Zealand imply voluntary bonds of mutual defense interest. As early as 1949, Australia, New Zealand, and Great Britain agreed to coordinate defense planning in the so-called ANZAM area.[35] In 1955 Australia and New Zealand agreed to contribute forces to a Commonwealth division on what they considered their "defense frontier" in Malaya, and they have also agreed to contribute additional land, air, and naval forces to the Commonwealth "strategic reserve." [36]

The long-range British defense aim in Asia, as recently disclosed by the London government, is to reduce military forces in the area

[29] Washington Post, September 7, 1956, p. 6. South Vietnam has shown interest in joining SEATO and in March 1956 its National Assembly sent a message to the Karachi meeting of the SEATO Council stating that South Vietnam was not bound by the Geneva agreements. New York Times, March 9, 1956, p. 5. After a visit of Secretary of State Dulles to South Vietnam, during which he reportedly said there was "no early probability" that South Vietnam would be invited to join SEATO (Washington Post, March 15, 1956, p. 7), the government in Saigon issued a declaration in which it said it "could not accept on its territory the presence of any foreign troops nor the cession of military bases. It did not see any longer the necessity of joining any military alliance." Translation from Bulletin de Viet Nam, April 13, 1956, published by the High Commissioner of Vietnam in France.

[30] Art. IV (3).

[31] There are other British dependencies in the southeast Asian area such as Borneo and Sarawak.

[32] See terms of a defense agreement between British and Malayan authorities in the Times (London), January 11, 1957, p. 8. The Commonwealth strategic reserve is a reserve pool of armed forces for carrying out Commonwealth and international defense responsibilities.

[33] The Chief Minister of Malaya recently declared that British forces would be reduced by half after independence day. New York Times, March 14, 1957, p. 8. See also British White Paper on Defense, New York Times, April 5, 1957, p. 4.

[34] See terms of agreement between Great Britain and Singapore, New York Times, April 12, 1957, pp. 1–2.

[35] This includes Australia, New Zealand, Malaya, and Borneo. See Royal Institute of International Affairs. Collective Defense in Southeast Asia: the Manila Treaty and its Implications. London, 1956, p. 20.

[36] *Ibid.*, p. 160.

and to lean more heavily upon reserves in Britain and upon strengthened local forces.[37]

The only other European states that have defense commitments in the Far East are France, Portugal, and the Netherlands. The former now has no territorial possessions in Asia but is a member of SEATO. Except for a minor contingent in Laos, France has no military forces in the Asian area.[38] Portugal has several small territories in eastern and southern Asia,[39] and the Netherlands has the western portion of New Guinea.

Western military aid to Asian countries

Most of the Asian allies of the Western Powers are deficient in the industrial potential for modern armaments. The United States and Great Britain have therefore undertaken to furnish them with at least some of the armaments they need for their defense.

Currently the United States is channeling military assistance to countries [40] in Asia with which it has formal defense ties, as well as to South Vietnam, Laos, and Cambodia. As of the end of 1956 the United States had furnished countries in eastern and southeastern Asia with military assistance in the amount of $7 billion.[41] Perhaps three-fourths of this went to Japan, Korea, Taiwan, and South Vietnam.[42]

To advise and help train forces in countries receiving military aid there are 5 United States military assistance advisory groups—1 each in Taiwan, South Vietnam, Thailand, Cambodia, and the Philippines. These 5 groups in 1956 had a total of about 3,400 American military personnel, ranging from a 55-man group in Cambodia to a 2,600-man group in Taiwan.[43]

The United Kingdom sells military equipment to the states which are members of the Commonwealth in Asia and assists them in military training. Early in 1957 Great Britain agreed to help Malaya in training and developing its armed forces through cash grants and provision of equipment, and also to furnish financial aid over a 5-year period for fighting insurrection in that country.[44] The United Kingdom has also agreed to provide assistance to the Ceylonese Government for the development and training of the latter's armed forces.[45]

Communist alliances and military cooperation in Asia

In the Communist-held areas of Asia—the U. S. S. R., Outer Mongolia, mainland China, North Korea, and North Vietnam—military cooperation is close although in only two cases marked by formal treaties of alliance. The pact of alliance concluded on February 27, 1946, between the U. S. S. R. and the Outer Mongolian Republic

[37] British White Paper on Defense, New York Times, April 5, 1957, p. 4.

[38] Under the terms of the Geneva agreements France may maintain up to 3,500 soldiers in two establishments in Laos and can provide a mission up to 1,500 to help train the Laotian Army. Collective Defense in Southeast Asia, *op. cit.*, pp. 53–54.

[39] Examples are Macao, Timor, and Goa.

[40] Japan, South Korea, Taiwan, the Philippines, Thailand, and Pakistan. The United States military assistance program does not include Australia and New Zealand.

[41] Information from the Department of Defense. This figure covers a period beginning in fiscal 1950. It includes $3.8 billion of military equipment transferred to Japan and South Korea independently of the mutual security program. It includes aid to Japan, Korea, the Philippines, Laos, Cambodia, Vietnam, Thailand, and also aid earlier furnished to Burma and Indonesia. It does not include Pakistan.

[42] U. S. Senate Special Committee To Study the Foreign Aid Program. The Military Assistance Program of the United States, Washington, 1957, pp. 118–119.

[43] U. S. Senate Foreign Relations Committee. Mutual Security Act of 1956, hearings, Washington, 1956, p. 640.

[44] The Times (London), January 11, 1957, p. 8.

[45] Ibid., July 7, 1956, p. 6. Apparently the details of this assistance program have not yet been worked out.

provides for mutual consultation if either party is threatened with aggression, and material and military support in the event of armed attack.[46]

The two most powerful Communist regimes, China and the Soviet Union, are linked in a security pact, signed February 14, 1950,[47] which is aimed against a renewal of hostilities by Japan or "any other state which should unite with Japan, directly or indirectly, in acts of aggression." From the pact's inception, both Soviet and Chinese spokesmen have given it an anti-American import.[48] In case of an "aggression" under the terms of the treaty each party would "immediately render military and other assistance with all the means at its disposal."

No formal, published treaties of alliance exist between North Korea, North Vietnam and the other Communist governments, but military cooperation has been sustained and intimate. North Korean and Chinese Communist troops were partners in the Korean fighting and the Vietminh regime in North Vietnam has received much military assistance from its Communist comrades to the north.[49] By the provisions of the Geneva armistice accords of 1954 North Vietnam is forbidden to enter into a military coalition with any other country.

Communist military-aid programs [50]

The Soviet Union has been an arsenal of modern military equipment, including jet warplanes, for its Communist Chinese ally, and has sent many military advisers into China to help in organizing and training its military forces. The Soviet Union also supplied weapons and military equipment on a large scale to North Korea, both during and after the hostilities with South Korea, and dispatched numerous technical advisers to that country during the war.[51] There is evidence that Soviet military personnel participated actively on the Communist side in the Korean conflict.[52] Communist China provides military equipment and training to North Korea and to North Vietnam. However, since Communist China is known not to be capable presently of producing such equipment, much of the heavy and modern implements of war possessed by these regimes undoubtedly originates in the Soviet Union.[53]

In a few cases the Communist bloc has supplied arms to non-Communist countries in southern Asia. The principal recipient of these arms has been Afghanistan, although small amounts have also been sold to Burma and Indonesia Aid to Afghanistan has included small arms, artillery and aircraft. Soviet airmen fly the planes supplied to Afghanistan and maintenance is handled in the U. S. S. R.[54]

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[46] Wei, Henry. China and Soviet Russia. New York, D. Van Nostrand Co., 1956, p. 186.

[47] Text in Collection of Documents, pp. 594–595.

[48] Wei., op. cit., pp. 269–270. Recently Communist China has been reported as offering to terminate its treaty of alliance with the Soviet Union if Japan would conclude a nonaggression pact with the Peiping government. New York Times, April 23, 1957, p. 13.

[49] Hammer, Ellen J. The Struggle for Indochina continues: Geneva to Bandung. Stanford University Press, 1955, p. 21.

[50] Data in this section is based largely on: Joseph G. Whelan. Soviet Military Power in the Far East, Legislative Reference Service, Library of Congress, Washington, March 27, 1957 (typescript); and Fred Greene, Military Bases and Programs of Communist China, Legislative Reference Service, Library of Congress, Washington, March 22, 1957 (typescript). See also, Howard L. Boorman et al. Moscow-Peking Axis: Strengths and Strains, New York, Harper & Bros. (for the Council on Foreign Relations), 1957. pp. 50 and 214.

[51] Report by U. S. Department of Defense. Text in U. S. News & World Report, May 28, 1954, pp. 75–77.

[52] Testimony of a North Korean flier. See Kum Sok No. I Flew My MIG to Freedom, Saturday Evening Post, October 9, 1954, p. 20.

[53] See e. g., report in the New York Times, April 6, 1957, p. 2, that latest types of artillery and aircraft have been brought into North Korea.

[54] U. S. Senate Special Committee To Study the Foreign Aid Program. Foreign Assistance Activities of the Communist Bloc and Their Implications for the United States: A Study Prepared * * * by the Council for Economic and Industry Research, Inc., March 1957, pp. 19–20, 80–82.

Unallied states in southern Asia

Some states in southern Asia have adopted a policy of nonalliance with other countries and are often referred to as "neutralist." The states generally included in this group are Afghanistan, India, Nepal, Burma, Ceylon, and Indonesia. As previously mentioned, Laos and Cambodia have a special neutralized status under the Geneva agreements of 1954, and have adopted what are generally considered to be "neutralist" policies.[55]

The policy of nonalinement of the neutralist countries has been attributed to a number of factors, but as far as considerations of security are concerned it appears to spring, at least in some cases, from a belief that pacts, alliances, and bases on foreign soil contribute to international dissension and that a nonalliance policy can be "a positive and dynamic approach" to peace.[56] In pursuit of their positive "neutralism" the unallied states have endorsed "five principles," including mutual respect for national territorial integrity and nonaggression. These they have formally approved in various international agreements among themselves and with other countries, both Communist and non-Communist.[57]

Five of the unallied states—Afghanistan, India, Nepal, Burma, and Laos—border on the Soviet Union or Communist China. If any of the unallied states became a victim of aggression, it could appeal for assistance to the United Nations of which all of them are members. Subject to appropriate recommendations of the international security organization, other nations might then furnish aid to the victim of

[55] On a visit to Communist China in February 1956 Prince Norodom Sihanouk, Premier of Cambodia, declared:

"Cambodia is neutral * * * The Southeast Asian Treaty powers have told us that we would be automatically protected. We reject such protection because it can only bring us dishonor" (New York Times, March 2, 1956: 4). Premier Souvanna Phouma of Laos on a visit to Communist China in August 1956 signed a joint communique asserting:

"Laos declares that it is firmly resolved to carry out a policy of peace and neutrality, that it will not favor any military alliance as long as its security is not menaced and that it will not allow the installation on its territory of any foreign base" (Washington Star, August 26, 1956, p. A7).

Later the Prince declared that his country was not neutralist, but neutral, and had no intention of aligning itself with any bloc, even a neutralist bloc. "Our country is not placed between 2 ideologies, but between 2 large countries," he said. The Times (London), September 5, 1956, p. 8.

[56] Prime Minister Jawaharlal Nehru, often considered a leading spokesman for the Asian neutralists, in a radio address to the American people of December 18, 1956, declared: "The preservation of peace forms the central aim of India's policy. It is in the pursuit of this policy that we have chosen the path of nonalinement in any military or like pact or alliance. Nonalinement does not mean passivity of mind or action, lack of faith or conviction. * * * It is a positive and dynamic approach to such problems that confront us * * *

"We, therefore, endeavor to maintain friendly relations with all countries even though we may disagree with them in their policies or structure of government. We think that, by this approach, we can serve not only our country but, also, the larger causes of peace and good fellowship in the world." U. S. News & World Report, December 28, 1956, p. 64.

[57] The "five principles" are: (1) Mutual respect for each other's territorial integrity and sovereignty; (2) nonaggression; (3) noninterference in each other's internal affairs; (4) equality and mutual benefit; (5) peaceful coexistence.

A list of instances, not necessarily complete, in which nonallied Asian states have agreed with other countries to support the "five principles" follows:

Country	Date	How endorsed
India and Communist China	Apr. 29, 1954	Signed agreement.
Burma and North Vietnam	Nov. 29, 1954	Joint communique.
Yugoslavia and India	Dec. 23, 1954	Joint statement.
Cambodia and India	Mar. 18, 1955	Joint communique.
Russia and India	June 22, 1955	Joint statement.
Poland and India	June 25, 1955	Joint communique.
Communist China and Nepal	Aug. 1, 1955	Do.
India and Saudi Arabia	Dec. 12, 1955	Do.
Communist China and Laos	Aug. 23, 1956	Signed agreement.
Laos and North Vietnam	Aug. 30, 1956	Do.
India and Ethiopia	November 1956	Joint communique.

(List compiled by Reno J. Conti, Legislative Reference Service, Library of Congress.)

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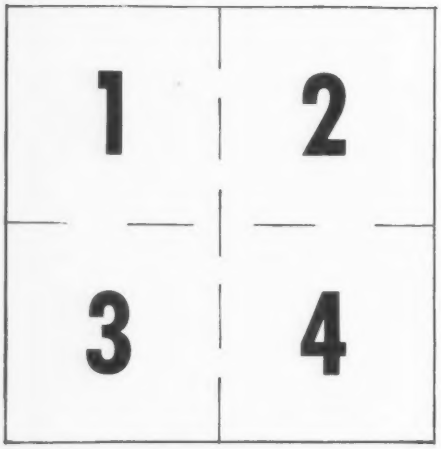

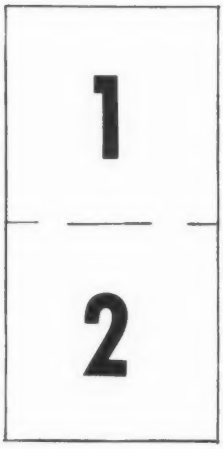

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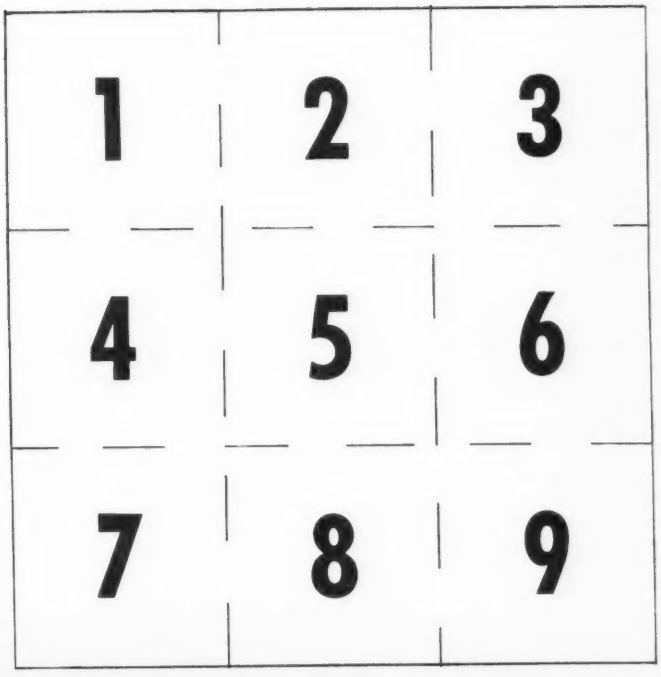
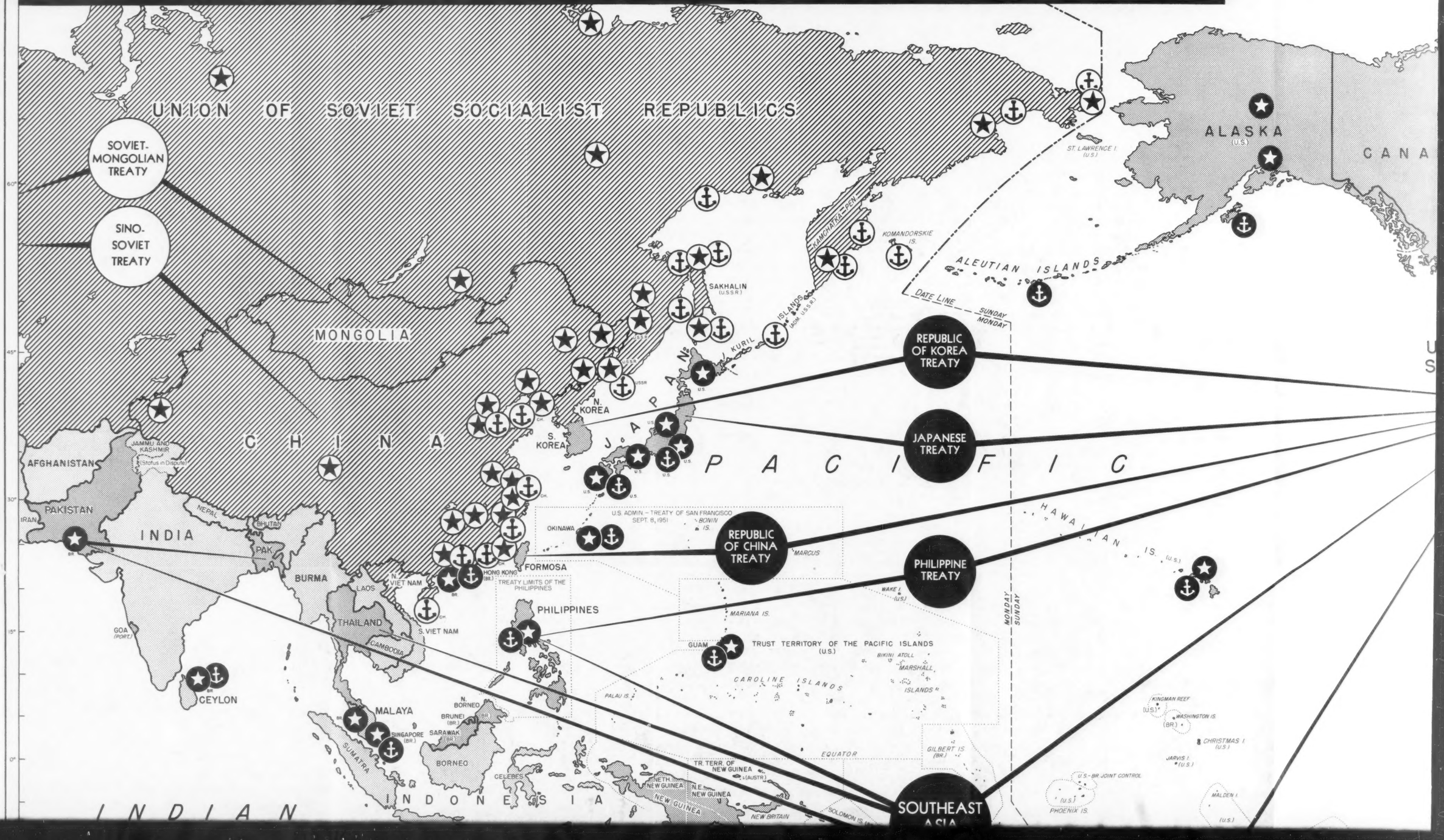


COLLECTIVE DEFENSE ARRANGEMENTS IN ASIA AND THE PACIFIC



COLLECTIVE DEFENSE ARRANGEMENTS IN ASIA AND THE PACIFIC

UNION OF SOVIET SOCIALIST REPUBLICS

SOVIET-MONGOLIAN TREATY

SINO-SOVIET TREATY

MONGOLIA

C H I N A

ALASKA (U.S.)

CANADA

ST. LAWRENCE I. (U.S.)

KAMCHATKA PEN.

KOMANDORSKIE IS.

ALEUTIAN ISLANDS

DATE LINE — SUNDAY / MONDAY

SAKHALIN (U.S.S.R.)

KURIL ISLANDS (ADM. U.S.S.R.)

N. KOREA

S. KOREA

J A P A N

P A C I F I C

UNITED STATES

REPUBLIC OF KOREA TREATY

JAPANESE TREATY

REPUBLIC OF CHINA TREATY

PHILIPPINE TREATY

SOUTHEAST ASIA TREATY

U.S. ADMIN – TREATY OF SAN FRANCISCO SEPT. 8, 1951

OKINAWA

BONIN IS.

MARCUS

FORMOSA

TREATY LIMITS OF THE PHILIPPINES

PHILIPPINES

WAKE I. (U.S.)

MARIANA IS.

GUAM

TRUST TERRITORY OF THE PACIFIC ISLANDS (U.S.)

BIKINI ATOLL

MARSHALL ISLANDS

CAROLINE ISLANDS

PALAU IS.

EQUATOR

GILBERT IS (BR.)

HAWAIIAN IS. (U.S.)

MONDAY / SUNDAY

KINGMAN REEF (U.S.)

WASHINGTON IS. (BR.)

CHRISTMAS I. (U.S.)

JARVIS I. (U.S.)

U.S.-BR JOINT CONTROL (U.S.)

PHOENIX IS.

MALDEN I. (U.S.)

JAMMU AND KASHMIR (Status in Dispute)

ANISTAN

AKISTAN

INDIA

NEPAL

BHUTAN

PAK

BURMA

LAOS

N. VIET NAM

S. VIET NAM

THAILAND

CAMBODIA

HONG KONG (BR.)

GOA (PORT.)

CEYLON

MALAYA

SINGAPORE (BR.)

N. BORNEO

BRUNEI (BR.)

SARAWAK (BR.)

BORNEO

SUMATRA

CELEBES

JAVA

TIMOR

TR. TERR. OF NEW GUINEA (AUSTR.)

NETH. NEW GUINEA

N.E. NEW GUINEA

NEW GUINEA

NEW BRITAIN

TERR. OF PAPUA

SOLOMON IS (BR.)

I N D I A N

I N D O N E S I A

MONGOLIA

C H I N A

P A C I F I C

I N D I A N

O C E A N

O C E A N

REPUBLIC OF KOREA TREATY

JAPANESE TREATY

REPUBLIC OF CHINA TREATY

PHILIPPINE TREATY

SOUTHEAST ASIA TREATY

ANZUS TREATY

JAPAN

KURIL IS. (U.S.S.R.)

N. KOREA

S. KOREA

AFGHANISTAN

JAMMU AND KASHMIR (Status in Dispute)

PAKISTAN

INDIA

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BHUTAN

PAK.

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TREATY LIMITS OF THE PHILIPPINES

PHILIPPINES

OKINAWA

U.S. ADMIN – TREATY OF SAN FRANCISCO SEPT. 8, 1951

BONIN IS.

MARCUS

WAKE I. (U.S.)

MARIANA IS.

GUAM

TRUST TERRITORY OF THE PACIFIC ISLANDS (U.S.)

BIKINI ATOLL

MARSHALL ISLANDS

CAROLINE ISLANDS

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NETH. NEW GUINEA

N.E. NEW GUINEA

NEW GUINEA

NEW BRITAIN

TERR. OF PAPUA (AUSTR.)

SOLOMON IS. (BR.)

AUSTRALIA

TASMANIA

NEW ZEALAND

CHATHAM IS. (N.Z.)

HAWAIIAN IS. (U.S.)

MONDAY

SUNDAY

KINGMAN REEF (U.S.)

WASHINGTON IS. (BR.)

CHRISTMAS I. (U.S.)

JARVIS I. (U.S.)

U.S.-BR. JOINT CONTROL

PHOENIX IS. (U.S.)

MALDEN I. (U.S.)

FLINT I. (U.S.)

SWAINS I. (TRUST N.Z.)

SAMOA IS. (U.S.)

(FR.)

FIJI IS. (BR.)

TONGA

COOK IS. (N.Z.)

TUAMOTU ARCHIPELAGO (FR.)

TUBUAI ARCHIPELAGO

NEW HEBRIDES (FR., BR.)

(FRANCE)

NEW CALEDONIA

LOYALTY IS.

KERMADEC IS. (N.Z.)

UNITED KINGDOM

FRANCE

ATLANTIC OCEAN

5° 0° 5°

55° 50° 45°

30°

EAST OF GREENWICH

WEST OF GREENWICH

75° 90° 105° 120° 135° 150° 165° 180° 165° 150° 135°

LEGEND

U.S. AND GREAT BRITAIN

NAVAL BASE

AIR BASE

Symbols show principal areas of air and naval base

U.S. and countries with which it has mutual defense treaties

Communist bloc

Truce lines

0 300 600 900 1200 STATUTE MILES

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Robert L. Bostick, May 1957
No. 1556

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REPUBLIC OF KOREA TREATY

JAPANESE TREATY

REPUBLIC OF CHINA TREATY

PHILIPPINE TREATY

SOUTHEAST ASIA TREATY

ANZUS TREATY

MONGOLIA

C H I N A

P A C I F I C

I N D I A N

O C E A N

AUSTRALIA

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N. KOREA

S. KOREA

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U.S. ADMIN – TREATY OF SAN FRANCISCO SEPT. 8, 1951

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U.S.-BR. JOINT CONTROL

PHOENIX IS. (U.S.)

MALDEN I. (U.S.)

FLINT I.

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SAMOA IS. (TRUST N.Z.)

FIJI IS. (BR.)

TONGA (BR.)

COOK IS. (N.Z.)

TUAMOTU ARCHIPELAGO (FR.)

TUBUAI ARCHIPELAGO

HENDERSON I. (BR.)

NEW HEBRIDES (FR., BR.)

NEW CALEDONIA (FRANCE)

LOYALTY IS.

KERMADEC IS. (N.Z.)

NEW ZEALAND

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CAMBODIA

UNITED KINGDOM

FRANCE

MONDAY

SUNDAY

EAST OF GREENWICH

WEST OF GREENWICH

LEGEND

U.S. AND GREAT BRITAIN — COMMUNIST

NAVAL BASE

AIR BASE

Symbols show principal areas of air and naval bases.

U.S. and countries with which it has mutual defense treaties

Communist bloc

Truce lines

0 300 600 900 1200 STATUTE MILES

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Bostick, May 1957
No. 1556

aggression. In case of emergency, the nation attacked could appeal under article 51 of the United Nations Charter [58] directly to other countries to assist it in a collective defense action.

The map opposite shows the formal defense alliances concluded by states in the Pacific-Asian area. It also shows the location of the armistice lines in Korea, Vietnam, and Kashmir. A discussion of problems related to these armistices is given below in chapter E. The map also shows areas where, according to published sources, air and naval bases of the United States, Great Britain, Soviet Russia, and Communist China are located. Published information on the bases of the latter two countries is limited, and the map is intended to show only some of the principal areas where such bases are said to be situated. The symbols on the map have no significance as to the size or number of bases in a particular area.

C. United States Defense Strategy in Asia

An examination of the defense plans of the United States and its allies in eastern and southern Asia is essential for an understanding of the effect of disarmament proposals upon the security of the area. In general, defense of those Asian States linked in military alliance with the United States and other Western Powers is based on the concept of maintaining local forces with sufficient strength to resist indirect aggression and to withstand an overt enemy attack until the power of the Western allies can be brought to bear.[59] Large American ground forces are not stationed on most of the territories of Asian allies because this is considered divisive of American armed strength. In case of aggression against any Asian country in the defense network, United States strategists want a strong, highly mobile force to be available to shift quickly to the danger center and strike at the enemy as circumstances require. A large proportion of this force would be composed of air and naval units.[60]

A basic element in United States defense strategy in the Western Pacific is the nuclear capability possessed by its military forces. The sea and air fleets of the United States in the Western Pacific, and to a growing extent its mobile striking army, are reportedly equipped with atomic firepower. Large strategic aircraft designed to handle nuclear bombs are based in the Western Pacific at Guam,[61] and bases for heavy jet bombers exist or are under construction in Okinawa, Japan,

[58] Art. 51 of the charter provides "Nothing in the present charter shall impair the inherent right of individual or collective self-defense if an armed attack occurs against a member of the United Nations, until the Security Council has taken the measures necessary to maintain international peace and security * * *"

[59] Admiral Felix B. Stump, commander in chief of the U. S. Pacific Command, in speaking of American aid to Far Eastern countries before the Senate Foreign Relations Committee in 1956, declared: "* * * Aid must be continued in such proportions as to enable the indigenous troops in the Pacific Command, now receiving United States military aid, to maintain internal security. Should the Communists resume their military aggression, these native forces must also be equipped and trained to retard Communist advances until the provisions of collective defense can be implemented" (U. S. Senate Committee on Foreign Relations. Mutual Security Act of 1956, hearings. * * * Washington, 1956, p. 639).

[60] In June 1956, Secretary Dulles declared: "* * * it was understood from the very beginning that we would not attempt to establish a force-in-being in SEATO comparable to the force-in-being which is assigned to NATO. We have to depend primarily upon an appropriate cooperation of local forces-in-being with the mobile striking power of the United States which is available in the Western Pacific and which is available to be used wherever it needs to be used. It may have to be used in Korea; it may have to be used in Taiwan; or it may have to be used in Vietnam or other places which cannot now be known.

"Pinning down particular forces to particular areas would not be to increase the strength generally of the position in the Far East but actually would be to weaken it. * * *" (Department of State Bulletin, June 25, 1956, p. 1067).

[61] U. S. Senate Committee on Armed Services, Subcommittee on the Air Force. Study of Airpower, hearings * * * 1956, p. 129.

and the Philippines.[62] The United States Seventh Fleet, which operates in the Western Pacific, has the capability of striking with nuclear weapons.[63] United States Army forces in the Pacific are reportedly being equipped with missiles and artillery capable of delivering atomic explosives.[64] Several of the atomic support commands which the President has announced as being formed "as backup for the ground forces of allied countries" are reportedly slated for the Pacific area. They will be stationed, according to these reports, in such areas as Okinawa and Alaska.[65]

The general strategy, whereby the United States would employ its nuclear-war power in Asia, has been outlined by Secretary of State Dulles. At one time he laid down a general principle that local defense against aggression should be reinforced by the "further deterrent of massive retaliatory power" [66]—a principle widely interpreted as sanctioning the large-scale use of nuclear weapons, if necessary. In a further definition of the principle, Secretary Dulles asserted that retaliation would be "selective," [67] a term that suggests that all-out retaliation would not automatically follow each aggression, but according to circumstances would be limited in area, targets, or weapons.

To the principle of "selective retaliation," Secretary Dulles has added the concept of what might be called "a margin of punishment." According to this concept, "The important thing is that the aggressor must know in advance he is going to lose more than he can win. He doesn't have to lose *much* more. It just has to be *something* more." [68] The idea is not just to stop the aggression but to "punish" the aggressor by striking him a little harder. The hope apparently is that the prospect of this additional element of "punishment" will assist in deterring aggressive action.[69]

Application of strategic principles in Asia

The manner in which the principles of "punishment" and "selectivity" in retaliation would apply to aggression in the Asian region has been indicated by the Secretary of State. On various occasions he has declared that the theater of an Asian war could be made broader than the original area of Communist attack and that greater reliance should be placed on sea and air strength.

For instance, at the end of 1953, he declared: [70]

* * * If there is a renewal of hostilities in Korea or if the Chinese Communists should openly intervene in Indochina, the reactions on our part would not necessarily be confined to the particular area which the Communists chose to make the

[62] U. S. News & World Report, Oct. 5, 1956, p. 63.

[63] Adm. Arleigh Burke, United States Chief of Naval Operations, asserted in Chicago on May 7, 1957, that the Seventh Fleet in the Western Pacific possesses an atomic capability. Information furnished by the Department of the Navy.

[64] U. S. News & World Report, Oct. 5, 1956, pp. 62-63: Secretary of State Dulles at the SEATO meeting in Canberra in March 1957 declared that United States forces "almost everywhere" are equipped with atomic weapons. "It is almost a normal part of their equipment," he told a news conference (Evening Star (Washington), Mar. 13, 1957, p. 1). All U. S. Army divisions are scheduled for reorganization to possess an atomic capability (New York Times, Apr. 4, 1957, p. 12).

[65] See the President's analysis of the budget, New York Times, Jan. 17, 1957, p. 16. Washington Post, Jan. 18, 1957, p. A8.

[66] Department of State Bulletin, Jan. 25, 1954, p. 108.

[67] Department of State Bulletin, Dec. 19, 1955, p. 1003-1007.

[68] Shepley, James. How Dulles Averted War, Life, Jan. 16, 1956, p. 78. Secretary Dulles had previously expressed a similar idea in Policy for Security and Peace, Foreign Affairs, Apr. 1954, pp. 358-359.

[69] Secretary of the Air Force Donald Quarles (now Deputy Secretary of Defense), expressed an idea similar to that of Secretary Dulles on Sept. 26, 1956. He declared: "Our military strategy must now be based upon convincing a potential aggressor by our strength in being that he cannot hope to gain anything by starting a war, big or little, against us—that such a war would in fact leave the aggressor worse off than when he started." Department of Defense news release No. 999-56.

[70] Press conference of December 29, 1953. Department of State Bulletin, Jan. 11, 1954, p. 42.

theater of their new aggression. The implication * * * is that, instead of trying to meet any such new agressions merely by land power of our own in Asia, there would be more reliance on sea and air power which would give us a greater choice.

Despite his support of these two principles Secretary Dulles has indicated that the targets of retaliatory action should not be indiscriminate or unlimited. A few years ago when discussing the possibility of retaliation against Communist China, Secretary Dulles, it is reported, asserted that the targets should be "specific" and "reasonably related to the area." He added that they would "not involve massive destruction of great population centers like Shanghai, Peking, or Canton." [71] What the exact scope of military action would be he left purposely undefined in order to keep the enemy ignorant of exact United States intentions.[72]

"Little" wars in Asia

An important question in regard to defense strategy in eastern and southern Asia is that of the "little" or "limited" war. It is this type of war that has been the favorite method of Communist armed aggression in Asia. Since the end of World War II Asian peace has been ruptured by half a dozen limited conflicts between Communist and non-Communist forces. The biggest of these was the Korean conflict in which a couple of million men saw action. Other "limited" wars have occurred in Indochina, China, Burma, Malaya, and the Philippines. In all of these countries fighting has now dwindled or stopped, but there is continuing danger that hostilities might reerupt in these or other areas.

Nuclear weapons have thus far not been employed in any of the "little" wars that have occurred in Asia since World War II. During the Korean war there was discussion of the possibility of their employment, but the United States never made a decision to resort to them. The reasons, never officially disclosed, presumably embraced such factors as whether targets suitable for mass devastation weapons existed in Korea, the possible effect on Asian opinion, the risk of expanding the war, and whether the United States stockpile included tactical nuclear weapons suitable for a limited battlefield. Another important factor in terms of global strategy was whether the then existing stockpile of atomic bombs allowed a surplus for use in Korea.

Nuclear methods of warfare have now been so thoroughly accepted by the defense leaders of the United States that they are ready to use them if necessary even in limited wars.[73] As many observers say,

[71] Shepley, James. Op. cit., p. 78. In 1954 Secretary Dulles wrote in Foreign Affairs magazine: "A would-be aggressor will hesitate to commit aggression if he knows in advance that he thereby not only exposes those particular forces which he chooses to use for his aggression, but also deprives his other assets of 'sanctuary' status. That does not mean turning every local war into a world war. It does not mean that if there is a Communist attack somewhere in Asia, atom or hydrogen bombs will necessarily be dropped on the great industrial centers of China or Russia. It does mean that the free world must maintain the collective means and be willing to use them in the way which most effectively makes aggression too risky and expensive to be tempting" (Policy for Security and Peace, Foreign Affairs, April 1954, p. 359).

[72] In 1954 Mr. Dulles wrote: "Today, if aggression were resumed, the United Nations Command would certainly feel free to inflict heavy damage upon the aggressor beyond the immediate area which he chose for his aggression. That need not meen indulging in atomic warfare throughout Asia. It should not be stated in advance precisely what would be the scope of military action if new aggression occurred. That is a matter as to which the aggressor had best remain ignorant" (ibid., p. 360).

[73] Secretary of Defense Charles E. Wilson declared early in 1957: "* * * our basic defense policy is based on the use of atomic weapons in a major war and is based on the use of such atomic weapons as would be militarily feasible and usable in a smaller war * * *". Adm. Arthur W. Radford, Chairman of the Joint Chiefs of Staff, asserted at the same time: "* * * our whole military program is based on the use of atomic weapons in a global war and on the use of atomic weapons in accordance with military necessity in situations short of global war. In other words, we have built our program to integrate atomic weapons into our offensive and defensive capabilities" (U. S. House of Representatives, Committee on Appropriations, Department of Defense Appropriations for 1958, hearings * * * Washington, 1957, pp. 36-37).

atomic weapons are becoming conventional.[74] The growing conversion of armed forces to nuclear weapons has, however, aroused controversy on the role of these weapons in American strategy. Some military leaders, particularly in the United States Army, reportedly advocate retention of a substantial capability for waging conventional (nonatomic) warfare because they think that in certain regions of the world, such as Asia, atomic methods might not be wholly appropriate or feasible. In those areas where resort to collective measures against attack would depend upon consent of the party attacked, some observers believe that such consent might be tardy or absent if the people feared devastation of their territory by atomic weapons.[75]

In addition, this view holds that an excessive trend toward atomic armament is unwise because it is doubtful that it will be effective in deterring small wars. Gen. Maxwell D. Taylor, United States Army Chief of Staff, has asserted that atomic striking power did not determine the military outcome of the conflicts in Korea and Indochina, nor did it prevent Communist infiltration of Malaya. In this view, since nuclear deterrence may not prevent small wars there must be other means of coping with them.[76] The kind of military defense this school of thought advocates for small wars is essentially a land action with little if any role for large nuclear weapons.[77] The great danger, according to this group, is that the utilization of large nuclear arms in a small war will convert it into a big one.

On the other hand, some observers maintain that the same mutual nuclear deterrence that prevents big wars can also prevent little ones. According to this thesis even limited or small aggressions should be met with the full force of United States atomic power.[78] Faced with such a threat, a potential aggressor would consider a small war unprofitable. This view stresses the deterrent effect of atomic weapons upon a potential aggressor. But, if a little war should nevertheless break out, it contends that the best way to keep it from graduating into total war would be to end it quickly.[79]

A key issue in the controversy is the practicability of keeping "little" wars little. In addition to those views already described, some observers take the stand that the chances a small war would slide into a big one are really not very great. These observers trust in the stabilizing effect of the spreading popular knowledge of the destructiveness

[74] President Eisenhower said at a press conference on January 23, 1957, "I suppose I said that we do regard these smaller (atomic) weapons as an almost routine part of our equipment nowadays * * *" (New York Times, Jan. 24, 1957, p. 13).

[75] New York Times, Jan. 24, 1957; p. 13. Indochina is an example of an area where the consent of the countries concerned is required explicitly by the SEATO Treaty before collective defense procedures can be taken on their territory. See above, p. 461.

[76] General Taylor has asserted: "These facts are a reminder of the possibility of small war situations occurring under the umbrella of mutual deterrence in the massive atomic field and the need for an adequate means of dealing with them quickly." (Address before Union League Club, New York, December 10, 1956. Department of Defense News Release No. 1268-56).

[77] "As one considers the potential trouble spots in the world today, such as the Middle East, South Vietnam, Taiwan, and Korea, one is bound to reflect on the varied requirements for effective military action in these areas * * * But they have at least one characteristic in common—any military action therein will be essentially a land operation with a very limited role, if any, for heavy weapons of great destructive power * * *" (Gen. Maxwell D. Taylor, Army Chief of Staff, U. S. Senate Committee on Appropriations, Department of Defense Appropriations for 1957, hearings * * * Washington, 1956, p. 79).

[78] Secretary of the Air Force Donald Quarles told the Air Force Association in New Orleans, August 4, 1956: "* * * The capabilities which now make total war an unacceptable proposition to a potential aggressor can also make limited aggression unacceptable. The weapons now in our arsenal * * * are capable of visiting appalling destruction on military forces in the field as well as on strategic targets. The potential aggressor, contemplating a piecemeal-type grab of the territory of the free world, if confronted with the awful consequence of atomic counterattack, could not hope to succeed in his aggression nor to reap other than a highly unprofitable whirlwind in the process. No morality and no logic requires the defender to meet aggression with the same type forces that the aggressor chooses to employ. * * *

"If it were obvious that limited aggressions would be met with the full force of atomic weapons, I do not believe such aggressions would occur. * * *" Department of Defense news release No. 770-56.

[79] Speech of Secretary Quarles in New York, September 26, 1956. Department of Defense news release No. 999-56.

of an all-out hydrogen bomb war to keep limited conflicts within bounds.[80] Still another opinion advanced by some observers is that the development of small or tactical size atomic arms increases the feasibility of conducting a nuclear war relatively restricted in dimensions and this diminishes the probability that a small war would slip into a big one.[81] However, production of nuclear munitions of small size is reportedly only in its initial stages and current supplies are said to be low.[82] According to one authority it will be 3 to 5 years before the United States Army has enough tactical atomic weapons to reduce use of conventional ammunition in a war by as much as 25 percent.[83]

D. Effect of Disarmament Proposals on Defense Strategy in Asia

Proposals for limitation of armed forces and armaments

Proposals advanced by the Western nations and the Soviet Union in the United Nations for worldwide reduction of military forces envisage the fixing of maximum limits for the Armed Forces of the principal great powers and the application of these manpower ceilings as standards for limiting the quantity of armaments allowed each national military establishment. According to published sources, the present manpower strengths in round numbers of the largest Western and Communist defense establishments are as follows:

Country	*Total armed forces*
United States	2, 800, 000
Great Britain	[1] 690, 000
France	[1] 690, 000
U. S. S. R.	[2] 2, 800, 000
Communist China	[3] 3, 000, 000

[1] New York Times, Apr. 12, 1957, p. 10.
[2] Estimated figure, based on supposition the U. S. S. R. made the cuts in its armed forces announced in 1955 and 1956. New York Times, Apr. 12, 1957, p. 10.
[3] See table below, p. 17.

Under the proposals advanced by the Soviet Union for worldwide manpower and conventional arms reduction the United States, the U. S. S. R., and China would each have a maximum force level of 1,500,000 men, while Great Britain and France would have 650,000 each. In other words, the 2 Communist nations would have a total of 3 million men in comparison with 2,800,000 for the 3 Western Powers. At one time, in 1952, the Western nations also proposed the same levels now advocated by the Soviet Union, but they did so on the supposition that these levels would be reached only at the end of a process of disarmament involving settlement of major political problems and effective control of nuclear weapons.[84] Realization of these suppositions does not appear imminent, and the United States has proposed as a first step that the forces of the United States, the U. S. S. R., and China be reduced to 2,500,000 men and that Great Britain and France have upper limits of 750,000 men each. This proposal would allow a total of 5 million for the 2 Communist powers and 4 million for the 3 Western nations. Since Great Britain

[80] See, for example, Blackett. P. M. S. Atomic Weapons and East-West Relations. London, Cambridge University Press, 1956, p. 2.
[81] See e. g., On Limiting Atomic War. London, Royal Institute of International Affairs, 1956, passim.
[82] Washington Daily News, February 6, 1957, p. 6.
[83] Magruder, Lt. Gen. Carter B., U. S. Army Deputy Chief of Staff, Logistics. U. S. Senate Armed Services Subcommittee on Preparedness, Proposed Closing of Certain Government-Owned Ordnance Plants, hearings * ° * 1957, p. 18.
[84] See U. S. Senate Subcommittee on Disarmament. Control and Reduction of Armaments: A Decade of Negotiations 1946–56 (Staff Study No. 3), Washington, 1956, p. 184.

has already announced plans to cut back its regular armed forces to 375,000 by 1962, a figure well below that permitted under this plan, the total Western manpower would actually be less than the proposed maximum.[85] The Soviet Union has accepted the figure of 2,500,000 as the first stage of a manpower reduction, but only on condition that its recommended level of 1,500,000 be accepted for the second stage.[86]

The details of armaments reduction proposed by the United States have not been spelled out, but recently American negotiators have suggested that the manpower cutbacks to the initial level of 2,500,000 men—which in effect would amount to approximately a 10-percent reduction—should be accompanied by a 10-percent decrease in armaments and a 10-percent cutback in military budgets. The United States has further suggested that, if the initial 10-percent cut works out successfully, it would then be possible to consider an additional 15-percent reduction.[87] The Soviet Union has proposed that the initial cutback be accompanied by a 15-percent reduction in armaments and military budgets.[88] Very recently the United States appears to have abandoned a percentage reduction in favor of a "negotiated" cutback."[89]

As part of their general armed forces reduction proposals the western powers have proposed that the smaller countries be assigned the maximum manpower levels up to 500,000 men. The Soviet Union on the other hand has proposed a ceiling of 150,000 to 200,000 men for the smaller states.

The accompanying table, listing published estimates of the size of armed forces of Asian countries, shows in which instances the Soviet and western plans of arms limitation would impose cutbacks on existing military establishments of Asian states.

[85] British White Paper on Defense. *Op cit.* According to press reports, the recent United States proposals in the London Disarmament Subcommittee for an initial arms reduction no longer include China. (Washington Post, May 24, 1957; pp. A1 and A10.) The method whereby the United States would bring the Peiping Government into a disarmament agreement has not been officially disclosed.

[86] See text of Soviet proposals in New York Times, May 15, 1957, p. 8.

[87] New York Times, Apr. 9, 1957, pp. 1 and 4. The United States proposals for armament reductions cover all arms for delivering explosives upon an enemy—planes, tanks, missiles, artillery, etc.—whether these explosives are nuclear or nonnuclear. Washington Post, May 24, 1957, p. A10. In June 1957 the United States was reported to have suggested second and third stage reeuctions of military manpower to 2,100,000 and 1,700,000, respectively. New York Times, June 23, 1957, p. E3.

[88] New York Times, May 15, 1957, p. 8.

[89] A new United States proposal at the end of June 1957 apparently dropped the idea of a specific percentage reduction and substituted therefor "negotiated lists" of armaments to be sequestered in depots under international inspection. New York Times, June 27, 1957, p. 1.

Estimates of armed forces in Pacific area and in eastern and southern Asia based on published sources

Country	Population (in thousands)[1]	Number in armed forces	Reduction under Soviet or western proposals
Countries linked with United States by security treaty:			
Australia	9,479	51,000 [2]	
Republic of China	9,316	500,000 plus [3]	Soviet and western.
Japan	90,400	197,150 [4] (goal is 250,000)	Soviet. Reduction from goal.
Republic of Korea	21,526	650,000 [5]	Soviet and western.
New Zealand	2,209	9,200 [6]	
Pakistan	83,603	180,000 [6] to 200,000 [7]	
Philippines	22,265	40,000 plus [6]	
Thailand	20,686	90,000 [6]	
Communist countries or areas:			
North Korea	[8] 8,474	790,000 [9] (490,000 North Koreans and 300,000 Communist Chinese).	Soviet, also western if Communist Chinese forces are counted.
Communist China	582,603	3,000,000 [10]	Soviet and western.
North Vietnam	[11] 13,000	250,000 to 350,000 [12]	Soviet.
Other countries or areas:			
Burma	19,856	33,000 [13]	
Cambodia	4,358	40,000 [14]	
Ceylon	8,783	1,050 [13]	
Hong Kong	2,440	11,000 [7]	
India	381,690	400,000 [7]	Soviet.
Indonesia	81,900	247,931 [15]	Do.
Laos	1,425	25,000 [16]	
Malaya	6,152	10,000 plus 25,000 British troops.[16]	
Nepal	8,432	20,000 [13]	
South Vietnam	[11] 12,000	150,000 [17]	

[1] United Nations Statistical Paper, Series A, vol. 9, Population and Vital Statistics Reports, April 1957. Latest official estimate.
[2] The Times (London), Aug. 23, 1956, p. 7.
[3] Washington Star, July 28, 1955, p. 18. One source says 600,000. W. W. Rostow and Richard Hatch. An American Policy in Asia, Massachusetts Institute of Technology, 1955, p. 25.
[4] New York Times, Jan. 17, 1957, p. 8.
[5] Washington Star, July 28, 1955, op. cit.
[6] U. S. News & World Report, Feb. 24, 1956, p. 76.
[7] Jules Menken. Arms and the Men, National and English Review, September 1956, p. 135.
[8] Democratic People's Republic of Korea and Republic of Korea is 30 million and the Republic of Korea 21,526,000.
[9] New York Times, June 17, 1956, p. 4E.
[10] Estimates of the size of the Chinese armed forces range from 2,500,000 to as high as 5 million men; 3,000,000 is selected as a working figure. New York Times, Mar. 12, 1955; Aug. 21, 1955, p. E3; Rostow and Hatch, Op. cit., p. 321. Jules Menken, Arms and the Men, Op. cit.
[11] Data for North and South Vietnam is not official. The U. N. source above cites 26,300,000 as the latest estimate for all Vietnam. In another publication, the estimated population of North Vietnam is given as 13 million, and of South Vietnam as 12 million. Summary of Labor Situation in Republic of Vietnam. International Cooperation Administration, Office of Labor Affairs, prepared by U. S. Department of Labor, Bureau of Labor Statistics, February 1957.
[12] Washington Post, Aug. 29, 1955, p. 2; Washington Star, Dec. 4, 1955, p. A27.
[13] Aviation Studies. International, Ltd. Airforce and Naval Air Statistical Record. London. As amended to Apr. 10, 1956.
[14] Washington Post, Dec. 6, 1955, p. 4.
[15] New York Times, Apr. 25, 1957, p. 16.
[16] New York Times, Mar. 14, 1957, p. 8.
[17] Senator Mike Mansfield. Report on Vietnam, Cambodia, Laos, Oct. 6, 1955.

Significance of proposals for limitation of manpower

At the lower military manpower level advocated by the Soviet Union, American leaders are reported as believing the United States would be unable to supply manpower sufficient to back up its defense commitments, either in Asia or elsewhere around the globe.[90] At the present time the Soviet Union and Communist China have in Asia forces much more numerous than those of the United States and Great Britain. The United States has roughly 250,000, Air, Navy, and Army personnel in Japan, Okinawa, and Korea, plus Air and Naval units at Guam and in the Philippines and Taiwan that bring

[90] See U. S. Senate Subcommittee on Disarmament. Control and Reduction of Armaments: Disarmament and Security in Europe (Staff Study No. 5) Washington, 1956, p. 240.

the total in the Western Pacific close to 500,000.[91] In 1956 the British had about 25,000 soldiers in the Malayan area in addition to 11,000 in Hong Kong, a battalion in Korea, and sea and air contingents.[92] However, present British defense plans call for cutbacks in these overseas units. Weighing against the total available Western forces of less than 600,000 men and the 1,500,000 soldiers of their allies in Eastern and Southern Asia are several million soldiers in Communist China and close to a million Red Army men in Siberia.[93]

Some authorities believe that American support of the higher manpower quotas is founded on a consideration of the relative geographical locations of the Communist and Western States. The "inner" position of the Communist States and their possession of the military initiative enables them to concentrate larger numbers of troops closer to the contested areas of Asia more readily than the Western nations can. The "outer" position of the Western Powers on the other hand imposes upon them handicaps of distance in operating against Communist target areas and in transporting their forces to trouble spots.[94] Some observers maintain that the optimum conditions in Korea where there was a relatively rapid build up and easy maintenance of United States forces due to the fact that they were only a short distance from bases and supplies in Japan would be difficult to duplicate in Southern Asia.[95]

Technological considerations also seem to have a bearing on the levels of armed forces advocated by the Western governments and the Soviet Union. Because of the marked technological superiority of the United States over at least one of the major Communist powers, China, the former can more effectively equip a higher quota of military manpower than can the government of Peiping. The Soviet Union, on the other hand, at the lower manpower level which it advocates, might be in a position to offset the industrial limitations of its Communist Chinese ally by transferring its surplus weapons to the Chinese People's Liberation Army. Such a transfer would appear to be excluded, however, by the recent United States proposal that the arms withdrawn from use as the result of adoption of a disarmament plan be stored in "special depots" under international surveillance.[96]

If the Soviet propositions for limitation of military manpower and armaments went into effect right now, leading military powers in Asia, such as Nationalist China, South Korea, and India, would have to make substantial reductions to fall within the maximum of 200,000

[91] U. S. News & World Report, October 5, 1956, p. 62. In June 1957 the United States announced it would begin withdrawing its Army Forces, numbering 25,000, from Japan. New York Times, June 23, 1957, p. 1.

[92] Jules Menken. Arms and the Men, National and English Review, September 1956, pp. 134-135.

[93] The estimate for the Siberian army is as of 1956. See Joseph Whelan, Op. cit.

[94] "The Soviet Union, with an army of 1,500,000 would be in almost as strong a strategic position as it is today * * * when you demobilize soldiers * * *. They are simply sent home; they can be called back on comparatively short notice. The United States could recall its men, too; but for us to cut down to 1,500,000 would mean that most of the men on overseas bases would have to be brought home across continents and oceans; and it would take months to send them back if an emergency arose. The Russians, because of their internal lines of communication need fewer men under arms than we do; they are poised at the center of the spider's web, while we are spread around the periphery. This is why, when the Russians propose that we both cut down to 1,500,000 men, they are, in fact proposing that the world's strategic balance be tipped in their favor." Speech by William R. Frye, Detroit, October 18, 1956.

[95] One author has written: "The location of Korea was also a great advantage for us in the war * * *. Korea lies next door to Japan, our only major military base in all of Asia and the only highly industrialized region outside of the Western World. During the Korean war, Japan was our 'privileged sanctuary,' which was far more valuable to us than Manchuria was to our enemies. Because of the American military facilities in Japan and the reserves of skilled labor to be found there, campaigning in Korea was like fighting in our own backyard, compared with fighting in the really remote parts of Asia from Singapore westward toward Suez." Edwin O. Reischauer. Wanted: An Asian Policy, New York. Alfred A. Knopf, 1955, p. 177.

[96] The United States plan was that the armament affected by its proposed percent reductions would be placed in "disarmament depots" under United Nations inspection in order to assure that they were not used. See Washington Post, April 9, 1957, p. 1.

suggested in the Soviet plan. None of these countries has defense links with other Asian states and under the Soviet plan each would be relegated to a permanent inferior position in relation to the militarily united Communist Asian bloc. If the Western proposals went into effect right now, the non-Communist countries would be required to make only small reductions or none at all.

Nuclear weapons and manpower levels

Control of nuclear explosive materials is envisaged in both the Soviet and Western disarmament proposals. Whether manpower should be limited independently of any steps to control atomic materials is a matter of dispute. It is a question, however, that might affect the levels of military manpower ultimately agreed upon. One view apparently widely held is that atomic armaments can compensate for military manpower deficiencies. If this is true then the availability of nuclear firepower for the defense of free Asia would enable allied forces to be smaller than would otherwise be necessary. Some observers think, however, that the nuclear stalemate [97] and the complexity of modern weapons might necessitate larger armed forces rather than smaller.[98] Much, too, would apparently depend on whether the opposing forces had atomic arms of comparable quality and effectiveness. If they did, then the atomic arms factor would tend to be canceled out and manpower relationships would resume a position of greater importance.[99] If they did not, then the side with the superior atomic firepower might not have to give as much weight to its manpower complement, provided strategic and tactical conditions were not such as to limit appreciably the usefulness of its superior atomic capability.[100]

Manpower levels and the threat of subversion

The military manpower quotas allotted to the free Asian nations under any disarmament plan would also have to take into account the problem of subversion. Communist-inspired insurrection, combined with intensive propaganda and political penetration, has been a favorite tactic of international communism in southeast Asia since the end of World War II. Although the capabilities of the Communists in fomenting insurrectionary strife and in stimulating other forms of subversion have been demonstrated to be a dangerous aggressive force, it might be difficult, if not impossible, to include guerrilla insurgents or armed infiltration groups in a formal plan for limiting national armed forces.[101] For this reason any disarmament formula would need to take into consideration the allocation to free countries threatened by Communist-inspired rebellion or infiltration of military manpower quotas large enough to cope with this form of Communist aggression.[102]

[97] A situation in which the major powers are deterred from waging all-out nuclear war on each other because of the fear of retaliation.

[98] U. S. Senate Special Committee To Study the Foreign Aid Program. The Military Assistance Program of the United States. Washington, 1957, pp. 2-3.

[99] One technical factor which if substantiated could favor an inherently smaller size for defensive military forces equipped with tactical atomic weapons is that warfare waged by such means might favor the defense more than the offense. See, e. g., Blackett, P. M. S. Atomic Weapons and East-West Relations, Cambridge University Press, 1956, p. 7.

[100] See below p. 474.

[101] Roberts, Henry L., Russia and America: Danger and Prospects. New York, New American Library, 1956, p. 122.

[102] See· Collective Defense in Southeast Asia, op. cit., pp. 146-149.

Impact of nuclear disarmament proposals on United States strategy in Asia

The position of the United States on the necessity of linking proposals concerning nuclear disarmament with proposals to reduce conventional weapons is unclear at the present time. However, some governments have made proposals to forbid the use of atomic weapons without making reference to other forms of disarmament.[103] An examination of the effect of such proposals upon military strategy is valuable not only because it throws light on their feasibility but also because it helps to illuminate present strategic policy.

The aim of the United States, as previously mentioned, is to minimize the use of American ground forces in Asia and to rely heavily on the United States Navy and Air Force, armed with a nuclear capability, to repulse a Communist offensive.[104] If atomic weapons were banned, the present striking potential of the American naval and air forces would be substantially diminished. It is a disputed point whether, deprived of nuclear arms, sea and air fleets of the United States could stop a massive Communist assault. In fact, it has even been questioned whether air and sea forces with any kind of weapons could by themselves throw up a successful defense for a victim of aggression in southern Asia.[105]

A fundamental consideration in the question is that of the effectiveness of an atomic air and naval strategy in such an area, particularly in fighting a "little" war. In general, employment of nuclear weapons, especially those of the greatest destructiveness, appears to be more appropriate in technologically advanced regions where targets are more highly concentrated than they are in areas like Asia where vast distances and a low scale of industrial development make individual targets less appropriate for mass destruction explosives. On the other hand, it is the view of some that the economic structure of Asia would be appropriate for the employment of small, tactical atomic weapons in the sense that they could more easily be limited to strictly military or battlefield targets. Such a limitation they consider is one of the essential requisites for keeping a small war from expanding into a general conflagration.[106]

Another consideration affecting the employment of atomic explosives is that their use against guerrilla forces, or against rear areas as a means of applying maximum pressure on the aggressor nation, might incur numerous civilian casualties and thus have a deleterious effect on popular emotions in Asia, where there is a keen awareness that it was the only area on which the atomic bomb was actually dropped in World War II.[107] Whether the disadvantage of an unfavorable impact on Asian opinion would be overshadowed by the military advantage of carrying the war beyond the battleground again leads to a difference of views. On the one hand, advocates of a strategy of broadening the war theater seem to feel that this will act as a deterrent

[103] India seems to have made such a proposal. See Collection of Documents, p. 248. The Soviet Union also on numerous occasions has proposed, without reference to other forms of disarmament, that the use of atomic weapons be outlawed.

[104] See above p. 465.

[105] A recent study asserts that if SEATO is obliged to defend a state it "will not be possible to do so on the cheap by airpower and seapower alone * * * there is no substitute, in the form of warfare involved, for highly trained professional troops on the ground * * *." Royal Institute of International Affairs, Collective Defense in southeast Asia, London, 1956, p. 158.

[106] Osgood, Robert E., Limited War: The Challenge to American Strategy. University of Chicago Press, 1957, p. 251 ff.

[107] Reischauer, op. cit., pp. 179–180.

to war or that it would permit the United States a wider and more favorable choice of places to wage its military campaign.[108] Other observers, however, think that carrying hostilities beyond the original theater of aggression would increase the chances of converting the war into an all-out global conflict.[109]

Until the role that nuclear weapons can and should play in a war in Asia, especially a "small" war, becomes clearer, it will be difficult to assess the impact of a nuclear arms ban upon the defense strategy of the United States and its allies. If it be true that under current conditions in Asia small or tactical size atomic arms are suitable for warfare in that region, then a ban against large nuclear bombs would have a less critical effect on the free nations' defense strategy than a ban against all nuclear devices. A total ban on nuclear warmaking power would leave the defense of free Asia entirely dependent on manpower and conventional arms, a development which would necessitate a major alteration in the defensive preparations of the United States and its allies in Asia. Any decision by the great powers, however, to adopt a general prohibition of all nuclear war materials or just of large nuclear bombs would have to take into account strategic conditions in areas other than Asia. Moreover, there are other prerequisites for an effective prohibition of atomic explosives, such as the existence of a reliable inspection system, and these would have to be fulfilled before a ban would become acceptable.

Cessation of nuclear-weapons testing

One aspect of controlling nuclear weapons which deserves particular discussion in relation to the Far East is the proposal to cease nuclear-weapons tests. Throughout Asia feeling against the manufacture, use, or testing of nuclear weapons runs noticeably high. Pending agreement by the nuclear powers on the comprehensive control of nuclear weapons, many Asian people and nations have focused their efforts on bringing about a cessation of nuclear-weapons tests.

This deep concern about nuclear weapons has its roots in several factors. One of these is that the only employment of nuclear weapons in wartime occurred against Asian people—the inhabitants of Hiroshima and Nagasaki. In Japan, in particular, the memories and scars of the atomic bombs dropped at Hiroshima and Nagasaki have accentuated the fear of nuclear warfare.

A second important factor is that most of the tests of large nuclear weapons apparently have taken place in the Asian and Pacific area. The usual Soviet proving ground is located in southwest Siberia, north of India, Afghanistan, and Pakistan, and west of China; the United States has tested its largest weapons in the Pacific Islands under its trusteeship; and the third state which has tested nuclear weapons, the United Kingdom, has done so in the Australian area and near Christmas Island in the Central Pacific.[110] Prime Minister Nehru of India has stated:

[108] See above, p. 466-467.

[109] Those who opposed expanding the theater of hostilities in the Korean conflict feared that the result would be initiation of a global war. See, e. g., testimony of Gen. Omar Bradley, then Chairman of the Joint Chiefs of Staff, in U. S. Senate Committees on Armed Services and Foreign Relations. Military Situation in the Far East, Washington, 1951, p. 730.

[110] In addition to these Asian locations, tests of nuclear weapons have been held in Nevada and New Mexico by the United States, and are reported to have been held in the Barents Sea by the Soviet Union.

It is of great concern to us that Asia and her peoples appear to be always nearer these occurrences and experiments and their fearsome consequences, actual and potential.[111]

When, in spite of precautions, a nuclear-weapon test did cause personal injury and economic loss, as in the case of the Bikini explosion of March 1, 1954, it was Japanese fishermen and Marshall Islanders [112] who suffered the results. After recent Soviet tests the radioactivity of the atmosphere became so high that the Japanese Government warned that water should be boiled and vegetables washed carefully to make sure they were decontaminated.[113]

Many of the Asian countries have demonstrated their reaction to the continuation of nuclear-weapon tests. The final communique of the Conference of Asian-African nations at Bandung in 1955 declared:

Pending the total prohibition of the manufacture of nuclear and thermonuclear weapons, this Conference appealed to all the powers concerned to reach agreement to suspend experiments with such weapons.[114]

Japan sent five official protests and a special envoy to the United Kingdom in regard to plans for nuclear-weapon tests scheduled for Christmas Island in the spring of 1957,[115] and protests were also registered by Ceylon and Indonesia.[116] Japan also requested the Soviet Union and the United States to halt scheduled tests.

Several proposals have been made by Asian states on the limitation of nuclear tests. India in 1954 proposed a "standstill agreement" on nuclear explosions [117] which it has frequently reiterated. Premier Nehru recently suggested to the Asian Legal Consultative Committee that it examine how far nuclear-weapon tests conform to international law.[118]

In April 1957 Japan suggested that a United Nations Scientific Committee be established by General Assembly resolution to study whether it is possible to detect all nuclear-test explosions.[119] If detection was found to be possible, Japan proposed that tests be prohibited; if not, that efforts be made to improve detection methods. Japan proposed that meanwhile all tests should be registered with the United Nations in advance so that the Scientific Committee could evaluate the effect of each proposed test on "man and his environment" outside the territory of the country making the test. If the Committee found that the effects would be adverse, it would then recommend to the General Assembly or Security Council that the test be suspended. Gen. Carlos P. Romulo, Philippine Ambassador to the United States and delegate to the United Nations, has proposed that a limitation on tests be imposed to insure that the rate of testing not be increased, and that United Nations observers be employed to watch the precautions taken by detonating nations to reduce radiation contamination.[120]

The many protests against nuclear weapons tests and proposals for limitations on testing which have emanated from Asia emphasize the

[111] Collection of Documents, p. 249.
[112] In 1954 a group of Marshall Islanders petitioned the Trusteeship Council for the cessation of tests on the islands or for guaranties of safety precautions. The Council voted against a resolution to call off the tests (U. S. S. R., Syria, Burma, and Indonesia for; Australia, Belgium, United Kingdom, China, France, Haiti, Italy, New Zealand, and the United States against). India in 1954 suggested that the issue should be taken to the International Court of Justice. United Nations Review, May 1956, p. 6.
[113] Washington Post, April 19, 1957, p. 1.
[114] Collection of Documents, p. 258.
[115] New York Times, March 14, 1957, p. 14.
[116] New York Times, March 29, 1957, p. 5; and April 16, 1957, p. 5.
[117] Collection of Documents, p. 246.
[118] New York Times, April 19, 1957, p. 3.
[119] Observations of the Japanese Government presented to the United Nations Disarmament Subcommittee, April 9, 1957. Press Release of Embassy of Japan, April 18, 1957.
[120] Christian Science Monitor, January 10, 1956, p. F14.

effect of tests on public opinion in the area. It is apparent that the policies and statements of the major powers, not only in regard to testing but also on all aspects of the development, use, and control of nuclear weapons are closely followed by the nations bordering on the western Pacific.

The Soviet Union has made every effort to capitalize on the Asian feeling against nuclear weapons tests even while continuing its own tests. It has at various times advocated suspension of all nuclear test explosions or the discontinuance of tests of thermonuclear weapons independently of the attainment of agreement on other disarmament problems.[121] Recently at the very time that the radioactivity of the atmosphere over Japan was especially high as a result of Soviet tests, it was reported that the Soviet Union had urged Japan to join in an appeal to the Western Powers to halt further testing.[122] Coupled with a recent proposal to suspend tests for 2 or 3 years, the Soviet Union has proposed the establishment of monitoring stations within the Soviet Union, the United States, the United Kingdom, and Pacific areas for detecting nuclear explosions.[123]

The United States has generally taken the position that any limitation of nuclear weapons testing should be in the context of a more comprehensive agreement.[124] More recently, however, the United States has proposed that if it can be agreed that the future production of fissionable materials would be restricted to peaceful uses only, then nuclear tests could be stopped.[125] At the end of the Bermuda Conference, President Eisenhower and Prime Minister MacMillan of the United Kingdom stated that even before a general agreement, self-imposed restraint could and should be exercised by a nation conducting tests. They declared:[126]

> Therefore, on behalf of our two Governments we declare our intention to continue to conduct nuclear tests only in such manner as will keep world radiation from rising to more than a small fraction of the levels that might be hazardous. We look to the Soviet Union to exercise a similar restraint.

They also announced that they would be willing to register with the United Nations notice of intention to conduct future nuclear tests and permit limited international observation of the tests if the Soviet Union would do the same.

Disarmament proposals and foreign bases

Since the end of World War II the Soviet Union on numerous occasions has proposed the liquidation of bases on the territory of other states.[127] India, too, as part of its opposition to military alliances has condemned the maintenance of bases on foreign soil.[128] In the Asian-Pacific area adoption of these proposals would affect the United States almost exclusively. American military, air and naval bases are located in Japan, Korea, and the Philippines, as well as Okinawa. Termination of these bases would necessitate the withdrawal of the forward line of American defense hundreds of miles to

[121] New York Times, April 25, 1957, p. 4. U. N. Document DC/83, May 4, 1956, annex 5.
[122] New York Times, April 21, 1957, p. 1.
[123] New York Times, June 14, 1957, p. 1.
[124] U. S. Congress. Senate Committee on Foreign Relations. Subcommittee on Disarmament, hearings, pt. 1, p. 16.
[125] Subcommittee on Disarmament, hearings, pt. 12, p. 1129.
[126] Department of State Bulletin, April 8, 1957. P. 562.
[127] See, for example, the Bulganin proposals of November 17, 1956. New York Times, November 18, 1956, p. 33.
[128] Prime Minister Nehru of India told a United Nations gathering last December: "* * * this maintenance of armed forces all over the world on foreign soil is basically wrong, even though such maintenance is with the agreement of the countries concerned." New York Times, December 21, 1956, p. 4.

Alaska, Guam, the Pacific Trust Territory, and the Hawaiian Islands. Some British bases, for instance those in Pakistan, and Malaya when it becomes independent, might also be construed as being located on "foreign" territory. Soviet Russian and Chinese Communist bases in Asia are all on their own territory and thus would be unaffected by this proposal, except that the Chinese Communist forces based in North Korea would have to retreat behind the Yalu River boundary line between Korea and China.[129]

Although the United States has consistently rejected proposals for dismantling foreign bases, under certain conditions American bases could be negotiable.[130] If the political and military conditions that originally necessitated establishment of the bases were changed, for instance, if outstanding political problems such as those of Korea, Taiwan, and Vietnam were settled, or if the perfecting of long-range missiles or aircraft made overseas bases less necessary, then the feasibility of negotiating a withdrawal would be enhanced. One prerequisite to any agreement on overseas bases in Asia, however, would be the necessity of obtaining from the Communist states a quid pro quo that would match in strategic value the concession made by the United States in withdrawing from its western Pacific positions.

Proposals for aerial and ground inspection in Asia

United States bases overseas and the countries of Asia would also be affected by the American proposal for mutual aerial surveys, sometimes called the "open skies" plan, and the Soviet proposal for ground inspection, both advanced in 1955 as methods of preventing surprise attack.[131] The United States has agreed that if the Soviet Union accepted both proposals, it would negotiate to extend these inspection systems to bases on foreign territory and "to the forces of other countries." [132] Presumably such an extension would encompass the Communist ruled areas of Asia as well as those Asian countries allied with the United States and other Western Powers. It is not assured at this time whether all the Asian states concerned would be willing to participate in these inspection systems or even whether they would be wholly practicable in a region such as Asia.

The Soviet Union has rejected the complete "open skies" plan as suggested by the United States, but recently both the United States and the Soviet Union have sought a compromise in proposals for surveillance of limited expanses of Russian and American territory, some in the Pacific-Asian region. The United States, according to reports, has informally suggested that part of the North American Continent and an equal portion of eastern Siberia might be brought under the "open skies" inspection plan.[133] For its part, Moscow has suggested that large stretches of Europe be inspected aerially, as well

[129] See map, p. 465 There might be unpublicized Soviet bases in China, e. g., a submarine base on Hainan Island, but this is unverified. Russian forces in 1955 evacuated Port Arthur which they had occupied for 10 years. Howard L. Boorman et al., Moscow Peking Axis: Strengths and Strains, Harper & Bros., for the Council on Foreign Relations, 1957, p. 24.

[130] Subcommittee on Disarmament, hearings, pt. 1, p. 16.

[131] Collection of Documents, pp. 338-358. The United States proposal called for surveillance of its own territory and the territory of the U. S. S. R. by planes carrying photographic equipment. The Soviet proposals called for inspectors at communication and transportation centers in the United States and the Soviet Union.

[132] U.S. Department of State. The Geneva Meeting of Foreign Ministers, October 27 to Novemer 16, 1955, p. 202.

[133] According to one report Alaska was mentioned in the United States suggestion (Washington Daily News, May 1, 1957, p. 3). According to another, the United States mentioned the Canadian North and Pacific Northwest of the United States (New York Times, May 7 1957, p. 4). See also press conference of Secretary of State Dulles in New York Times, May 15, 1957, p. 10. More recently, United States proposals have concentrated mainly on the Arctic area as the most favorable place for inaugurating an inspection system.

as extensive tracts of the Soviet Union and of the United States.[134] As far as Asia and the Pacific are concerned, the Soviet plan stipulated that all the territory of the U. S. S. R. in Siberia from about the longitude of Lake Baikal to the Pacific Ocean,[135] and that all the territory of the United States west of approximately the line of the Mississippi River as well as Alaska be placed under "open skies" surveillance. The Soviet plan excludes important portions of both the U. S. S. R. and the United States, and does not extend to any non-Soviet or non-United States territories in Asia or the Pacific.

Western observers seem to agree that the western and Soviet areas that would be open to aerial scanning under this plan are of unequal military and economic importance. Although assertions that eastern Siberia is a "wasteland" appear exaggerated and there is evidence that important military bases and industrial establishments exist in this region, nevertheless the main military and industrial might of the U. S. S. R. is concentrated in the western regions of that country.[136] Over half of the United States would come under photographic scrutiny, however, including many of the most vital military centers and industrial complexes in the Nation. Although the Soviet plan would benefit the U. S. S. R. more than the United States as to the importance of the area covered, the United States would be likely to have an advantage with respect to information obtained. The location of major United States bases and industrial establishments are well known, whereas United States knowledge of the strategic centers of the Soviet Union is more limited. Any aerial survey of the Soviet Union, though limited, would increase the free world's awareness of Soviet military and industrial activity.

While some partial effectuation of the aerial photographic survey plan could be valuable as a demonstration of how the complete plan might work, or even under certain conditions could be effective in preventing surprise attack in limited areas, the Soviet proposals as they now stand appear to have major loopholes as far as preventing surprise assault in Asia is concerned. Since it does not extend to areas such as Korea or southeast Asia, it would not prevent Communist surprise attack there. It would not bring under observation those portions of the Soviet Union adjacent to western China through which military assistance for an aggression could be funneled into China or eventually into other Communist areas.[137] Moreover, even from the Soviet point of view its plan would seem to have deficiencies insofar as it does not cover such areas as Japan, Okinawa, the Philippines, Guam, or Hawaii, on all of which are major United States military bases.

Regulation of the arms trade

Still another possible means of regulating armaments in Asia is through control of the arms trade. As noted below,[138] measures to control the arms traffic into Korea and Vietnam were included in the armistice agreement for those countries, but they have not been

[134] New York Times, May 1, 1957, pp. 1 and 16; May 4, 1957, pp. 1 and 2.
[135] See map, p. 465.
[136] See, e. g., New York Times, May 4, 1957, p. 2; Evening Star (Washington), May 1, 1957, p. 1; Joseph Whelan, op. cit.
[137] A railroad through Sinkiang Province linking China and the U. S. S. R. is reported to be in the final stages of construction. Whelan, op. cit.
[138] See below p. 481 ff.

faithfully observed by the Communists. Elsewhere in eastern and southern Asia international efforts to ban or regulate the trade in weapons and munitions have been nonexistent or only indirect.

In order to strengthen their allies the Western Powers and the Communist countries have maintained an arms flow of considerable volume into the Asian area. The Communists have utilized such arms support to back up military aggression and to feed insurrectionary violence. Despite the aim of the American military assistance program to supply arms only for defense, in one case it has been an occasion of difficulty with friendly Asian countries. Both India and Afghanistan have expressed resentment at American armaments aid to Pakistan, largely on the ground that the latter might employ United States-furnished arms to settle current disputes between them and the Karachi government.[139]

Dangers in a situation like this are that an arms race might be stimulated between countries friendly to the United States, that a free country might be alienated from the United States because it feels the United States is helping its rival, or that one of the countries concerned might turn to the Communist bloc for military assistance.[140] The last alternative has already occurred in the case of Afghanistan.[141]

To prevent its military assistance to other countries from being diverted toward undesirable ends the United States has stipulated in law that any arms it provides to other nations shall be for legitimate self-defense or for collective measures consistent with the United Nations Charter, and that the "President shall be satisfied that [arms aid] will not be used to undertake any act of aggression against any nation." [142] Agreements designed to implement these provisions of the law have been concluded with countries receiving military aid. The agreement with Pakistan, for instance, provides that "Pakistan will not undertake any act of agression against any other nation." [143] As an added assurance to India the United States has promised to support that country if it should ever become victim of an armed aggression.[144] The difficulty of enforcing agreements restricting the use of United States arms aid in practice, however, was demonstrated in the Anglo-French invasion of Egypt in 1956.[145]

Until recently, the United States Government had not given its support to proposals for international control of the arms trade. When the Soviet Union suggested an arms embargo for the Middle East not long ago, the United States rejected the proposal on the ground that it would prejudice the military strengthening of free nations against Communist aggression.[146] In May 1957, however,

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[139] India and Pakistan are in controversy over the Province of Kashmir. See below, p. 487. Afghanistan and Pakistan have a quarrel over the Pakhtunistan question. For a summary of this issue see Armstrong, Hamilton Fish North of the Khyber, Foreign Affairs, July 1956, pp. 603–619.

[140] U. S. Senate Special Committee to Study the Foreign Aid Program. The Military Assistance Program of the United States, Washington, 1957, pp. 67–68.

[141] See above, p. 463.

[142] Sec. 105 (a, of the Mutual Security Act of 1954, as amended. The Military Assistance Program of the United States, pp. 160–161.

[143] Art. 1 of the Mutual Assistance Agreement of May 19, 1954. U. S. Department of State. Treaties and Other International Acts Series 2976.

[144] Secretary of State Dulles declared in New Delhi in March 1956 that if Pakistan used United States-supplied arms in an aggressive way against India, "under the principles of the United Nations Charter, the United States would be supporting India if it became victim of any armed aggression." New York Times, March 11, 1956, p. 3.

[145] One version of this incident is as follows: " • • • After the invasion began, the British apparently were called to task as to whether equipment which the United States had financed for the use of forces assigned to NATO was involved in this military action. The answer from a British statesman seems to have been that it was really quite difficult to keep straight the origins of all this equipment and that the question was therefore impossible to answer with precision. U. S. Senate Special Committee to Study the Foreign Aid Program, The Military Assistance Program of the United States, Washington, 1957, p. 69.

[146] See United States note rejecting Soviet proposals on the Middle East, New York Times, March 12, 1957, p. 4.

the United States proposed the adoption of international controls on the flow of arms. These would include, according to reports, "quotas and advance notice on imports and exports."[147]

E. Postwar Experience With Arms Control Agreements

Already in eastern and southern Asia there are international agreements in effect which include provisions on the control of armaments. The agreements all stem from recent armed conflict on the territory of Asian states. Examination of the experience accumulated in connection with these agreements will demonstrate some of the problems involved in attempting to control armaments, not only in the general area of Asia but throughout the world.[148]

Korean armistice

The primary purpose of the Korean Armistice Agreement, signed on July 27, 1953, was to bring an end to the hostilities which had begun with the North Korean aggression against South Korea 3 years earlier.[149] It was signed by a representative of the Korean People's Army and the Chinese People's Volunteers, for one side, and the United Nations Command for the other. To aid in maintaining the armistice until a political conference could bring about peaceful settlement of the Korean problem, it was agreed that reinforcement of military personnel and equipment would cease, although a limited amount of rotation of troops and replacement of existing equipment would be permitted. A demilitarized area approximately 2½ miles wide was created to serve as a buffer zone along the 200 mile demarcation line between Communist and United Nations forces. (See map, p. 11.)

To inspect and supervise the observance of the limitations on military forces and armaments, a Neutral Nations Supervisory Commission (NNSC) was established. It was composed of 4 officers, 2 appointed by the United Nations side (from Sweden and Switzerland) and 2 appointed by the Communist side (from Poland and Czechoslovakia). Inspection teams of the Neutral Nations Supervisory Commission were established to assist in supervising and inspecting the rotation of personnel and replacement of armaments. A Military Armistice Commission, composed of representatives of both the United Nations and the Communist sides, was charged with supervising the implementation of the agreement as a whole and settling through negotiations any violations of the agreement.

Observance of the armistice

The primary purpose of the armistice, to bring about and maintain a cessation of hostilities, has thus far been fulfilled. The demilitarized zone, too, inasmuch as the Military Armistice Commission has made no charges of violations, appears to have been respected. From the beginning, however, the Communists failed to comply with the provisions relating to the control of armaments.[150]

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[147] New York Times, May 8, 1957, p. 1.

[148] Experience with armistice provisions dealing with matters other than arms control is considered outside the scope of this study.

[149] For pertinent excerpts of the armistice, see: Collection of Documents, p. 396.

[150] See statement of Maj. Gen. Harlan C. Parks, USAF, senior member of the United Nations Command, Military Armistice Commission, July 5, 1955. Department of State Bulletin, August 1, 1955, p. 191.

The Communist side did not submit all the reports on personnel and combat material rotation required by the armistice,[151] and the reports which were submitted sometimes contained voluminous recitations of unimportant material while important information was either omitted or hidden among minute details.[152]

Introduction of equipment and personnel to reinforce the strength of North Korea, in violation of the armistice, took place continuously after the signing of the armistice.[153] Although the Communists had no aircraft in North Korea at the time of the signing of the armistice, 4 years later they had approximately 750 planes, half of them jets.[154] Moreover, it was reported that Communist ground forces were built up from 12 to 22 divisions with an increase in firepower of at least a third, and that the amount of attack equipment in North Korea was increased by at least 300 Russian-built tanks, 600 heavy-artillery pieces, and 550 heavy mortars.[155]

In spite of the violations of the armistice by the Communists in Korea, which resulted in a substantial increase in their military strength, the United Nations Command scrupulously observed the arms limitations for 4 years. The result of observance, however, was that the weapons in South Korea were growing obsolete and even difficult to replace.

The inspection system was similarly thwarted. Since the Neutral Nations Supervisory Commission had an even number of nations represented, Sweden, Switzerland, Czechoslovakia, and Poland, the Commission was constantly deadlocked by lack of a majority. This situation was rendered worse because the two Communist nations acted not in the spirit of neutrality but as champions of North Korean interests. They often vetoed inspections proposed for North Korea and obstructed the efforts of the Swiss and Swedish representatives to make effective inspections in the north.[156]

A report by the Swiss and Swedish representatives on the NNSC submitted to the Military Armistice Commission on May 7, 1954, stated:

> The United Nations Command side * * * took from the beginning a broad view of its obligations and threw itself open to full control by the neutral nations inspection teams stationed at the ports of entry in the territory under its military control * * *
>
> The Korean People's Army and Chinese People's Volunteers' side, on the other hand * * * never submitted any other documents for inspection than prior notification reports * * * the inspection teams were unable to check efficiently on other movements and this because of the stand taken by their Czechoslovak and Polish members * * * in [North Korea] the Czechoslovak and Polish members of the inspection teams, thanks to their "veto" power, have kept those spot-check controls to a bare minimum * * * they have merely become a face-saving device devoid of any real significance. The inspection teams in the north have therefore never gained the insight in movements of materiel as have the inspection teams in the south.[157]

On May 31, 1956, after the armistice had been in effect for almost 3 years, the United Nations Command representative announced that

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[151] From the time the armistice agreement went into effect until June 1955, the Communist side submitted a total of 162 combat materiel reports compared with 1,969 submitted by the United Nations Command. U. N. Command Statement of May 31, 1956. Department of State Bulletin, June 11, 1956, p. 968.

[152] Testimony of Arthur Dean before the Subcommittee on Disarmament, hearings, pt. 11, p. 964. U. N. Command Statement of May 31, 1956, Department of State Bulletin, June 11, 1956, p. 968.

[153] U. N. Command statement, July 11, 1956, p. 967.

[154] Statement by Edward S. Greenbaum, United States Representative to the General Assembly, January 4, 1957; Department of State Bulletin, January 28, 1957, p. 143.

[155] U. S. News & World Report, June 15, 1956, p. 73.

[156] U. N. Command statement, May 31, 1956; Department of State Bulletin, June 11, 1956, p. 967.

[157] Department of State Bulletin, June 11, 1956, p. 969.

as long as the Communist side continued to default in its obligations for inspection, the United Nations Command would suspend performance on its part of the armistice provisions governing operations of the NNSC and its inspection teams in the Republic of Korea.[158] The United Nations Command made it clear that the suspension applied only to the inspection activities of the NNSC, and that the United Nations would continue to regard the armistice agreement in force, to observe the limitations of arms introductions, and to report to the NNSC, which would be based entirely in the demilitarized zone.[159]

Barely more than a year later, on June 21, 1957, the United Nations Command took a similar step in regard to the provisions on the replacement of arms. It announced that the violations by the Communists had seriously upset the relative military balance existing on July 27, 1953, which the arms control provisions had been designed to insure. Therefore, the United Nations Command stated to the Communist side at Panmunjom:

> In view of these facts and your gross violations of the provisions of subparagraph 13D, the United Nations Command considers that it is entitled to be relieved of corresponding obligations under the provisions of this paragraph until such time as the relative military balance has been restored and your side, by its actions, has demonstrated its willingness to comply.[160]

It stated that the relative military balance could be attained only by the replacement of old weapons of the United Nations Command with new weapons, and that this step would be taken. As in the year before, the United Nations Command made clear that it intended to continue observing the cease-fire provision of the armistice and any others which were not affected by the suspension of subparagraph 13D.

Effectiveness of the armistice

The primary reason for the failure of the inspection system would appear to be the intention of the Communists to build up the strength of North Korea, regardless of the armistice agreement and without being hampered by investigation. Nevertheless, weaknesses in the armistice agreement may have rendered adequate inspection more difficult. For example, the failure to appoint countries which were all genuinely neutral to the NNSC, or at least a neutral chairman who would be able to break tie votes, made the NNSC almost inherently unworkable. Moreover, the armistice limited inspections of the NNSC to permitted ports of entry and places where violations of the armistice were reported to have occurred by members of the Military Observation Commission. To avoid the inspection permitted by the armistice at specific locations, the Communists bypassed at least one port of entry with a railroad [161] and even, it has been reported, moved entire villages.[162] In addition, the Communists received advance notice of inspections which enabled them to remove evidence of violations. Secretary Dulles has attributed the shortcomings of the Korean inspection system largely to the lack of the aerial inspections.[163]

[158] Several months earlier, the number and size of the inspection teams had been reduced at the request of the NNSC. The Swedish and Swiss members had long been concerned at the inability of the group to perform its functions due to the Communists. U. N. Command statement, May 31, 1956; Department of State Bulletin, June 11, 1956, p. 969.

[159] Report to the United Nations concerning Neutral Nations Supervisory Commission, Department of State Bulletin, September 3, 1956, p. 392.

[160] New York Times, June 22, 1957, p. 3.

[161] U. N. Command statement, May 31, 1956; Department of State Bulletin, June 11, 1956, p. 968.

[162] Testimony of Arthur Dean, op. cit., p. 964.

[163] U. S. Senate, Foreign Relations Committee, Subcommittee on Disarmament, hearing. p. 76.

The United States had favored inclusion of aerial-inspection provisions, but they had not been incorporated in the armistice because of objections by the Communists.

The provisions relating to the stabilization of forces and arms were written with the view that they were temporary measures. It was expected that they would last only until a political conference, which was supposed to take place within 90 days after the signing of the armistice, arrived at a permanent settlement based upon the unification of Korea.[164] However, it was almost a year before the Conference was held in Geneva, and even then a political settlement was not achieved.

Armistice agreements in Indochina

The agreements and declarations reached at the Geneva Conference in July 1954 brought an end to the hostilities which had plagued Indochina for 8 years.[165] Separate but similar armistice agreements were concluded at that time between the Communist-backed forces and the forces allied with France in Vietnam, Laos, and Cambodia. In Vietnam, which was divided into a Communist-controlled area in the north and a non-Communist area in the south, a 3-mile demilitarized zone was established on each side of the demarcation line separating the two areas. In all three states restrictions were placed on the introduction of military personnel and equipment, replacements being permitted but reinforcements generally prohibited.

The armistice placed restrictions on Cambodia, Laos, and North and South Vietnam on joining military alliances and on allowing any part of their territory to be used as a foreign military base.[166] Bases would be allowed in Laos and Cambodia only if their security were threatened and military alliances would be permitted if they were in conformity with the United Nations Charter and also with the armistice agreement.

In all three states an International Commission was established to control and supervise the provisions of the agreement. In each case the Commission was composed of representatives of Canada, Poland, and India, with the latter acting as Chairman. The Commission was to be assisted by fixed and mobile inspection teams.

Observance of the agreements

As in Korea, the main purpose of the armistice agreements—to bring about and maintain a cessation of hostilities—has thus far been generally successful, though only in Cambodia has the Control Commission been able to report that "a general political settlement may be said to have been achieved." [167]

A major outbreak of hostilities did occur in December 1954 in Laos, where there have been many "incidents," after an attack by the Communist-led Pathet Lao.[168] These Communist-led units, according to the terms of the armistice, were to be concentrated in two Laotian provinces pending a political settlement. The Laotian

[164] Collection of documents, p. 405.

[165] For excerpts of the Vietnamese armistice agreement, see Collection of Documents, p. 406. For other agreements and declarations made at the Conference, see Report on Indochina, Report of Senator Mike Mansfield on a study mission to Vietnam, Cambodia and Laos, October 15, 1954, Foreign Relations Committee Print, pp. 16–41.

[166] Two exceptions were made for Laos.

[167] Fourth Interim Report of the International Commission for Supervision and Control in Cambodia for the period April 1 to September 30, 1955. London, HMSO, 1956. Cmd. 9671, p. 7.

[168] Christian Science Monitor, December 10, 1955, p. 11.

Government accused the Communist-led forces of breaking the armistice in an effort to partition Laos.[169] It has also charged that North Vietnam has violated the armistice agreements by supplying Communist units in Laos with arms as well as cadres, which form the backbone of the Laotian Communist forces.[170] In 1956 the Control Commission achieved an agreement in principle between both sides that they would negotiate for the integration of Pathet Lao into the central government. To date, however, the Communists have demanded conditions that, observers believe, would facilitate the achievement of power by the Communists.[171]

Charges of violations of the arms control provisions in Vietnam have been made by both sides. The Communists have accused South Vietnam of violating the provisions of the armistice by importing new armaments, ammunition, and foreign military personnel. They have also charged that the United States has more military personnel in Vietnam than is permitted by the armistice.[172] They claim that foreign military bases are being set up and attempts are being made to include South Vietnam in a military bloc.[173] The United States claims that the Vietnamese Government and the United States have "scrupulously respected" the provisions but that the Communists have "violated them in the most blatant fashion." [174]

A United States official has stated that the military potential of free Vietnam has been drastically reduced by the withdrawal of almost 200,000 members of the French Expeditionary Corps and by the reduction of the Vietnamese Army by more than 50,000 and that since the cessation of hostilities more than $200 million worth of military equipment has been shipped out of Vietnam.[175]

In contrast, it is contended, the Vietminh have imported from China "voluminous quantities" of arms and Chinese Communist military personnel to work on railroads, roads, airports, and other projects.[176] It has also been officially reported that the Vietminh army has been so greatly strengthened by the incorporation and reequipment of irregular forces that, instead of the 7 Vietminh divisions in existence in July 1954, there are now no less than 20.[177]

If South Vietnam is observing the armistice limitations on reinforcements while North Vietnam is violating it, a situation similar to that which existed in Korea may be shaping up, where the Communist power was growing while that of the free part of the country remained static.

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[169] Ibid., December 10, 1955, p. 11.
[170] Ibid., July 7, 1956, p. 6.
[171] New York Times, April 25, 1957, p. 16.
[172] There were some 300 members of a United States military assistance group in Vietnam at the end of hostilities. The Communists charge there are now 2,000. However, this has been denied by the Defense Department spokesman who states there are 692 men in the group, half of whom were on a special temporary mission, New York Times, May 16, 1957, p. 11. North Vietnam also complained that the Cambodian-United States military assistance agreement was a violation of the armistice. However, the International Commission agreed that if certain interpretations were placed on the assistance agreement, it would not constitute a violation. Third Interim Report of the International Commission for Supervision and Control in Cambodia, Cmd. 9579. London, HMSO, 1955.
[173] Note addressed to the United Kingdom by the Union of Soviet Socialist Republics on March 30, 1956. Vietnam and the Geneva Agreements. Cmd. 9763. London. HMSO, 1956, p. 5.
[174] Robertson, Walter S., Department of State Bulletin, June 11, 1956, p. 973.
[175] Ibid.
[176] Ibid.
[177] Note addressed to the Union of Soviet Socialist Republics by the United Kingdom on April 9, 1956, Cmd. 9763, p. 8. This was denied by a spokesman for North Vietnam who said that 50,000 men have been demobilized. He countercharged that South Vietnam was expanding its regular troops to between 150,000 and 170,000 and the "security corps" to between 40,000 and 75,000, London Times, April 27, 1956, p. 11. A later broadcast from North Vietnam said that the northern regime had demobilized 80,000 men, New York Times, May 16, 1957, p. 11.

The South Vietnam Government has also accused the Communists of infiltrating southern territory with military forces.[178]

The reports of the International Commission for Supervision and Control are inconclusive as to whether the reinforcement provisions of the armistice are being substantially violated. Apparently as part of its policy of nonrecognition of the Geneva armistice, South Vietnam has lodged few complaints with the Commission regarding violation on the part of North Vietnam. The latter, however, has submitted voluminous complaints to the Commission for investigation. These investigations have revealed no large-scale violations on the part of South Vietnam, although some violations, particularly the failure to give advance notification to the Commission for the importation of military personnel and equipment, have been noted.

Evaluation of the inspection system

In one respect the International Commission for Supervision and Control in Vietnam was an obvious improvement over the Neutral Nations Supervisory Commission in Korea. The Commission, composed of representatives of Poland, Canada, and India, proved workable at least to the extent that it could obtain a majority decision to make investigations. Thus, even when the Polish member dissented from a measure to permit continuous surveillance of the most important lines of communication between China and Vietnam, the Canadian and Indian members were able to press for the essential surveillance. On certain issues, however, the armistice did require unanimity, and hence allowed the use of a veto.[179]

The Commission has reported many loopholes in its control system in both North and South Vietnam which could provide a means for the illegal introduction of personnel and materiel reinforcements. For example, the Commission said it has not been able to carry out reconnaissance of the offshore islands, where material could be unloaded, because the North Vietnam Government did not provide the necessary transportation. South Vietnam allowed a partial reconnaissance but refused complete reconnaissance until North Vietnam reciprocated.[180]

Like the Korean Commission the Commission in Vietnam was hampered by the geographic limitations placed on its inspections, because freedom of movement was permitted only in specified zones and action elsewhere was dependent on agreement with the government concerned. The Commission reported that both sides have given narrow legalistic interpretations to the articles of the agreement regarding the tasks and spheres of movement of the Commission's teams.[181]

The Commission also reported that it had met—

> restrictions and obstacles * * * in the form of inefficiency of local administrations, the narrowness of local officials or general misunderstanding regarding their tasks.[182]

Other obstacles, such as the requirement by South Vietnam for 24 to 48 hours' notice on the movement of inspection teams, have

[178] Christian Science Monitor, January 23, 1956, p. 2.
[179] Unanimity was required on recommendations for amendments or additions to the agreement and on certain other decisions.
[180] Sixth Interim Report of the International Commission for Supervision and Control in Vietnam, London, H. M. S. O., January 1957. Cmd. 31, p. 21.
[181] First Interim Report of the International Commission for Supervision and Control in Vietnam, London, H. M. S. O., 1955. Cmd. 9461, p. 30.
[182] Ibid.

hampered the International Commission. Moreover, it has not had the number of personnel which would be necessary to inspect thoroughly for adherence to the agreement. Sixteen teams of six men each had the duty of watching the 2,000 miles of coast as well as the interior.[183]

A major difficulty has been that the armistice was not signed by all the parties who would have to observe the agreement if it were to be effective. The Government of South Vietnam, for example, is not a party, even though it is a principal subject of the agreement. The French High Command signed the armistice for the non-Communist side, and was responsible to the International Commission for the implementation of the agreement, but as the French withdrew from power in Vietnam, civil and military administration passed into the hands of the Government of the State of Vietnam. Although the French Union High Command was disbanded on April 28, 1956, it still had the responsibility to provide transportation for the Commission in South Vietnam and to patrol the demarcation line jointly with Vietminh officers.[184]

The Government of South Vietnam has publicly declared that since it had not signed the Geneva agreement, it was not bound by it. Informally, however, the Diem Government has said that it would give full protection and practical cooperation to the Commission as an international peace commission.[185] Nevertheless, some demonstrations against the Commission have taken place in South Vietnam.[186]

In view of this situation, the Indian and Polish members of the Supervisory Commission said in a report that the Commission could not function effectively and that it—

> cannot carry on its activities in the face of the declared opposition of the Government of the State of Vietnam to the Geneva agreement merely on the basis of a personal or practical understanding which can be revoked at any time. In any case, any ad hoc arrangement outside the agreement, however effective, naturally amounts to revocation of the agreement and the Commission cannot be a party to any such arrangement.[187]

It called upon the Cochairmen of the Geneva Powers, the United Kingdom and the Soviet Union to resolve the problem.[188]

The two Cochairmen of the Geneva Conference, after a meeting, requested the Commission to continue its efforts pending the reunification of the country through the holding of free elections, and asked the governments of the two zones for full cooperation.[189]

Kashmir

Conflicting claims to tne State of Kashmir, which is located along the northern border of India and West Pakistan, with Afghanistan,

[183] London Times, April 27, 1956, p. 11.
[184] Economist, May 17, 1956, p. 675.
[185] Fourth Interim Report of the International Commission for Supervision and Control in Vietnam, April 11, 1955, to August 10, 1955. London, H. M. S. O., 1955. Cmd. 9654, p. 17. Bulletin du Vietnam, Commissariat de Vietnam en France, April 13, 1956.
[186] Fourth Interim Report of the ICSC in Vietnam, op. cit., p. 16.
[187] Ibid., p. 17.
[188] The Canadian representative issued a separate statement on this matter stating that the Commission had received the cooperation of the parties in carrying out the military provisions of the cease-fire agreement but that it had encountered difficulties in carrying out some of its other tasks in South Vietnam. It pointed out that despite the best efforts of the French High Command to cooperate, it could not implement its obligations to give full protection to the International Commission, and this situation had an adverse effect on the work of the Commission. Instead of referring the matter to the Cochairmen of the Conference, it expressed the hope that the parties directly concerned would be able to work out a more dependable arrangement so that the Commission would be in a more favorable position to carry out its functions. Ibid., pp. 24–25.
[189] Documents concerning the discussions between representatives of the United Kingdom and the Government of the Union of Soviet Socialist Republics held in London in April and May 1956. London, H. M. S. O., 1956. Cmd. 9763, pp. 10–11.

the Soviet Union, China, and Tibet to its north and east, led to flurries of hostilities between organized forces of India and Pakistan in Kashmir in 1948.[190] The United Nations Security Council established a Commission to exercise functions of good offices and investigation. The Commission adopted a resolution on August 13, 1948, which provided for a settlement in 3 parts: (1) the establishment of a cease-fire; (2) a truce agreement which would involve the withdrawal from Kashmir of Pakistani troops and tribesmen, and the bulk of the Indian troops (in order to restore the military balance to that which existed before the issue was brought to the Security Council); and (3) a plebiscite.

The cease-fire was arranged and went into effect on January 1, 1949. However, prolonged attempts to implement the demilitarization and plebiscite provisions of the above resolution have been unsuccessful. Except for small voluntary withdrawals, demilitarization has not taken place because the two sides would not agree on the number and kinds of troops which should remain on both sides of the line.

Nevertheless, there has been some experience in the control of armaments gained from the maintenance of the cease-fire. On July 27, 1949, the parties established a cease-fire line. It was provided that troops were to remain at least 500 yards from the line and although there could be some adjustment of defensive positions, the introduction of additional military potential by either side into Kashmir was prohibited.[191]

A military observer group was established by the United Nations to control and check the cease-fire. The number of observers has ranged from 25 to 50, all detailed from the national forces of various countries for service with the United Nations. Each observer team is located at a specific point on the cease-fire line and is rotated between the two sides in order to avoid a spirit of partisanship.[192]

The group investigates complaints of alleged cease-fire violations or border incidents. When it has completed its investigation, the observer team reports to the headquarters of the military observer group with its factual findings, its conclusions, and its recommendations. In case of actual fighting—which usually is in the form of patrol clashes—the observers attempt to bring the hostilities to a speedy conclusion.

Another operation of the observer group in Kashmir which might be employed in a control of armaments system is the recording of the identity and disposition of units of the two armies as well as any general troop information which might be covered by the provisions of the cease-fire agreement. The Indian and Pakistan Armies periodically submit reports of their units to an office of the chief military observer on its side of the cease-fire line. Both armies are supposed to inform the observers in advance of the withdrawal and replacement of all units. All such information is kept secret by the United Nations observers. It has been reported that—

[190] Lourie, Sylvain. The United Nations Military Observer Group in India and Pakistan. International Organization, February 1955, pp. 19–31.
[191] United Nations Document S/AC.12/TC.4, July 29, 1949.
[192] Lourie, op. cit., p. 26.

Both armies cooperate to the fullest in giving the military observer group an extensive and up-to-date picture of their military establishments and positions in Kashmir.[193]

It is up to the military observers to report any troop movements which might be a violation of the cease-fire agreement as well as the excessive buildup of any military supply depots or the construction or improvement of airfields. When a report of violation is received the observer group first tries to settle the matter in the field in accordance with the recommendations of the chief military observer. If this does not work, the issue is taken up with the army headquarters concerned. The chief military observer reports monthly to the Secretary General of the United Nations on the observer movements, on the maintenance of the cease-fire agreement, and on any incidents. It is believed that the United Nations group has been able to limit violations considerably and to settle all incidents with dispatch.[194]

Except for a few clashes of border patrols, the cease-fire has been maintained in spite of the persistent political tension between India and Pakistan on the Kashmir issue. In the opinion of one observer:

In large measure this has been due to the confidence which the opposing armies have come to have in the fairness and objectivity of the military observer groups as well as the fact that neither side wishes to appear in the role of violator of the cease-fire agreement.[195]

Observations on armament limitation agreements

In spite of unsettled political problems and continued tension in Korea, Indochina, and Kashmir, hostilities have not been renewed. Thus the main purposes of the armistice agreements in these areas have been achieved. In all cases the agreements, although intended for a temporary period until a political settlement could be reached, have been stretched beyond the short period of time originally envisaged. In no case is a political settlement in sight.

The arms-control provisions which were subsidiary to the purposes of the agreements have not been uniformly successful. The provisions for demilitarized zones between the opposing forces in Korea and Vietnam appear to have been observed and to have prevented border clashes. In Kashmir, where there have been several border clashes, the forces withdrew only 500 yards from the cease-fire line. The opposing forces in Laos, where there was a breach of the cease-fire, had not been separated by a demilitarized zone.[196]

The provisions on the stabilization of arms levels appear to have been the least observed. In North Korea and North Vietnam the Communists apparently have reinforced their military strength far beyond the rotation and replacement permitted by the armistice. Continued observance of these provisions by the non-Communist side would necessarily mean that their equipment would become increasingly obsolete.

[193] Lourie, op. cit., p. 29.
[194] Ibid., p. 30.
[195] Ibid., pp. 30-31.
[196] The Indian and Canadian members of the International Commission for Supervision and Control in Laos favored establishing a demilitarized zone between the opposing forces, but the Polish member took the position that this would constitute an amendment to the Geneva agreement and hence required unanimity. Second Interim Report of the International Commission for Supervision and Control in Laos. January 1-June 30, 1955, London, HMSO, 1955, Cmd. 9630, p. 16.

Adequate inspection has not existed in either Vietnam or Korea. In Korea the composition of the inspection group was almost inherently unworkable because the Communist members could stymie all action. The Vietnam experience has shown the difficulties of an inspection agreement when the nations subject to inspection have not cooperated fully. The inspection systems for Korea and Indochina have both demonstrated the limitations of a ground observation system which allows freedom of inspection only in limited geographical areas or which requires advance notifications of inspections.

The lack of adequate enforcement provisions has been evident in both Korea and Indochina. Negotiations between the two sides on alleged violations, as provided for in the armistices, have been insufficient. Apparently the only additional attempt to stop violations of the arms limitation provisions has been through publicizing the violations. When this has been unsuccessful, the only alternative action taken, other than to let the violations continue, has been to announce that part of the armistice agreement is void on the grounds of violation by the other side.

F. Concluding Observations

There are many reasons why arms control negotiations should not overlook southern and eastern Asia. The fact that many of the open hostilities since the end of the Second World War have taken place in southern and eastern Asia, emphasizes the need to make every effort to curtail the possibility of further warfare. Already, as a result of the agreements which brought the various hostilities to an end, the region has furnished a substantial part of the limited experience which the world has had in the control of armaments. In addition, many nations of Asia have expressed strong sentiments against the armaments race of the big powers, and they are anxious to use peaceful means to resolve international differences.

Through various alliances, people in many parts of the world, including the United States, have a stake in peace in Asia. However, there are as many barriers to achieving an agreement on the control and reduction of armament in Asia as elsewhere. As has been pointed out, the implementation of various disarmament proposals would have far-reaching ramifications for present Free World defense in the Far East. Therefore, all such proposals must be carefully considered to insure that they would lessen the threat of war and not lessen the ability of the Free World to prevent a war or fight it if it should occur.

In addition to the military and technical problems which have been discussed in this study, there are complex political problems and tensions in eastern and southern Asia which closely relate to the control and reduction of armaments in the area. These problems have generally not been discussed in this study. However, their relationship to the control and reduction of armaments must constantly be kept in mind.

Tension will persist as long as no solution is found for the problems created by the three divided states—Korea, Vietnam, and China. Moreover, since Communist China has the largest military force of the Asian nations, any comprehensive system of control and reduction of armaments in Asia would have to encompass its forces. There are also other rivalries and political problems in the area, such as the

dispute between India and Pakistan over Kashmir, which might inhibit the willingness of states to alter present security systems to include arms control measures.

On the other hand, it may be more difficult to find a solution to the pressing political problems of the area when tension over them is heightened by the constant awareness of powerful forces and armaments ready to be brought into action. For this reason it would appear imperative to promote peace in the area by a dual approach involving efforts both to bring armaments under control and to solve the political problems.

DETECTION OF AND INSPECTION FOR UNDERGROUND NUCLEAR EXPLOSIONS

REPLIES FROM SEISMOLOGISTS TO SUBCOMMITTEE QUESTIONNAIRE

STAFF STUDY NO. 10

JUNE 23, 1958

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PREFACE

By Senator Hubert H. Humphrey

An international agreement to suspend nuclear weapons tests, to be effective, requires a system of inspection. The inspection system must assure, to the greatest degree possible, that no nation and no group could violate the agreement without being exposed. The most important aspect of such an inspection system is the detection of underground explosions. Such explosions, presently the most difficult to detect, would be the most likely means by which a nation, bent on cheating, would try to evade the provisions of the agreement.

The weight of evidence produced by this study, Detection of and Inspection for Underground Nuclear Explosions, indicates that an inspection system for a nuclear test moratorium could provide a high degree of assurance that no country would risk violating the agreement by trying to conduct tests in secret. The evidence contained in this study consists of the replies of 31 eminent seismologists who have had experience in studying records of underground and surface phenomena.

My conclusions based on the data presented by the seismologists in this report and from testimony in hearings and other work of the subcommittee are as follows and refer primarily to the detection and inspection of underground explosions.

1. An inspection system to monitor a suspension of nuclear weapons tests could have a 90-percent capability. This means that virtually 90 percent of the significant earthquakes would be identified correctly. Furthermore, if an unauthorized nuclear weapon, i. e., 1 kiloton or higher, were tested underground there would be a 90-percent chance that suspicious evidence would be recorded on scientific instruments, which in turn would call for investigation.

However, this capability could be increased through additional research and through the use of the best possible equipment stationed and operated throughout many parts of the world. An increase in the capability might also be achieved through the use of mobile inspection teams which would be permitted to investigate areas where the records of seismographs and other detection instruments were ambiguous as to whether an earthquake had occurred or a nuclear explosion had been detonated.

2. Seismographic stations manned by international inspection personnel would need to be placed at many points in the Soviet Union and surrounding areas. Such stations would also have to be located in the United States and throughout the United States and British testing grounds in the Pacific, and in certain other areas.

3. There would need to be a central agency to which the seismographic records would be sent for analysis. This agency should be operated under the auspices of the United Nations. Rather than establish a completely new agency, the facilities and experience of the International Central Bureau of Seismology at Strasbourg, France,

might be utilized and expanded. This Bureau, centrally located in France, is directed by the International Association of Seismology of the International Union of Geodesy and Geophysics It has had many years of experience in receiving and analyzing seismographic records from all parts of the world. The utilization of the International Union of Geodesy and Geophysics and the Strasbourg Bureau would enable the mobilization of the rich resources of talent of many nations, such as those of Japan. The United Nations might contract with the IUGG to establish the central reporting agency for seismic, and possibly acoustical and electromagnetic detection and inspection. The Strasbourg Bureau would need to be considerably expanded before it could perform a reliable and timely reporting and coordinating service.

4. The number of seismograph stations to be placed in the Soviet Union, the United States, and elsewhere would appear to depend on (*a*) their location (more should be placed in areas where earthquakes occur than in nonseismic areas); (*b*) the extent to which existing stations including those of the Soviet Union could be utilized; (*c*) how many stations of good quality could be utilized or set up in areas where tests might take place; (*d*) to what extent mobile inspection teams will have authority to visit areas in which ambiguous earth movements take place (this refers primarily to the ability of seismologists to distinguish correctly between earthquakes and explosions); and (*e*) whether all nations will permit observers at the site of large chemical explosions (no reliable way has as yet been found to differentiate between underground chemical and nuclear explosions). The number of stations as well as other characteristics of the inspection system would also depend on whether all nuclear weapons tests were suspended, as opposed to a limitation on certain sizes of tests, and finally, whether 90 percent assurance is essential as opposed to a 60, 70, or 80 percent assurance that the agreement to suspend tests cannot be violated secretly.

5. An agreement to suspend tests should be for a sufficient period of time to allow the inspection system to be established and evaluated in terms of effective and reliable operation. Most of the seismologists estimate it would take from 1 to 2 years to complete the establishment of an adequate inspection system.

6. An international agreement to suspend tests ought to provide for continued research and testing under international supervision and registry for two purposes. One would be to check the effectiveness of the inspection system. For example, tests should be conducted in areas in which earthquakes are frequent; some should be conducted under an icecap or in the most porous material possible. Tests should be conducted in the various ways which have been suggested as possibilities for evading an agreement to suspend tests. Such a step would appear to be vital if the agreement is to cover even small explosions. Such explosions appear to be much more difficult to distinguish from earthquakes than those of larger yields.

The other purpose to be served by continued tests under international supervision and control would be to allow for further development of nuclear explosives for peaceful uses. Scientists have only begun to explore the vast possibilities in peaceful uses of nuclear explosives. Drilling for oil in the desert; creating deep harbors out of shallow waters; and making reservoirs, building tunnels, and numer-

ous other exploits must be explored if atomic energy is to be utilized effectively for constructive rather than destructive purposes. Controlled and supervised continued testing would also give us valuable information about the structure and composition of the interior of the earth.

If testing is continued for these two purposes it is imperative that it be done under international supervision or international auspices. It would also be desirable to restrict all such tests to yields of a few kilotons, at the maximum.

In assessing the advantages and the disadvantages of an international agreement to suspend nuclear weapons tests with inspection it is essential that we view such a step in the total perspective of national security, defense policy, and foreign policy including our goals for comprehensive control and reduction of armaments.

The arms race of today is primarily a qualitative race. Each nation is attempting to develop the most destructive weapons, or the most precise weapons, or the weapons with the longest range, or weapons with some other special quality. The quantity of armaments is important, but it is the constant improvement in quality, or even the development of entirely new weapons, which causes a nation to expend some of its best resources and energies in an effort to keep up to date. It is for this reason that a suspension of nuclear weapons tests would constitute a meaningful disarmament measure. A suspension of tests would greatly impede, if not prohibit, the development of new types of nuclear weapons. It would also prevent the development of nuclear weapons by any nation which has not already made the tests essential to prove new weapons.

A suspension of tests would not, however, reduce the numbers of atomic and hydrogen bombs in the stockpiles of the United States and the Soviet Union. It would not prevent those stockpiles from being enlarged with more of the same kinds of bombs already in existence.

An international agreement to suspend nuclear weapons tests, therefore, must be regarded as a first step. It must be concluded with the understanding that other steps must follow. One of the steps that should follow is an agreement to cease production of fissionable material for weapons purposes and here again under a carefully designed inspection system. If an agreement to suspend weapons tests was limited to a reasonable period and if during that time no progress was made on other arms control measures, then the entire question of the continuation of the ban should be reexamined. A suspension of tests should be what it says—a suspension for a limited period of time to determine whether the inspection system is workable, and whether the Soviets are truly interested in reducing tension through other arms control measures, through cooperative projects and political settlements of major disputes.

The important thing to keep in mind is that under an effective agreement to suspend tests, the United States and the Soviet Union as well as other countries would all be affected. All would have weapons development restrained in the field of atomic weaponry. It is also important to keep in mind that other aspects of our defense would not be affected. Development of long-range rockets, the perfection of other delivery systems, production of conventional arma-

ments, and improved training of our Armed Forces would not be a part of a weapons test moratorium.

Much of the opposition to a suspension of tests stems from the realization that it would effectively put us on the road to arms control and a new type of security system. Some believe that the risks in taking this course are too great. I believe, however, that the alleged risks should be weighed against the risks in the course we are already taking—the risks of an unchecked arms race, the risks of a precarious balance of power in which both sides are so heavily armed that a minor incident could result in catastrophe for the whole world. Furthermore, a suspension of nuclear weapons tests for a limited period with inspection would amount to a significant political breakthrough and might result in a relaxation of tension, an increase in confidence, and closer contacts between the United States and the Soviet Union as well as other countries. To try to isolate any country from the community of nations is always a questionable policy. Isolation only brings about misunderstanding and miscalculations. Inspection for disarmament is one small way to help achieve a more peaceful and free world.

This staff study contains the complete text of each reply to the questionnaire, all of the replies to each question, and a summary analysis prepared by Ellen C. Collier, a member of the subcommittee staff on assignment from the Legislative Reference Service of the Library of Congress. Neither the summary nor the replies necessarily reflects the views of the subcommittee or any of its members.

I would like to express the appreciation of the subcommittee to all those scientists who replied to the questionnaire, and to the United States Coast and Geodetic Survey for its invaluable assistance and guidance.

JUNE 23, 1958.

CONTROL AND REDUCTION OF ARMAMENTS

I. SUMMARY ANALYSIS

A. Introduction

One of the principal issues involved in an international agreement to suspend nuclear weapons tests is the nature of the inspection system to verify that the agreement is being observed. In order to obtain reliable data on this matter, the chairman of the Subcommittee on Disarmament sent to leading seismologists throughout the United States a questionnaire on the detection and identification of underground nuclear explosions.

The subcommittee dealt specifically with the problem of underground explosions because these are the most difficult to detect and identify.

The purpose of the questionnaire was to gather information and data on the following major points:

(1) the distances at which seismographic instruments could detect and identify underground explosions;

(2) whether seismographic evidence could distinguish an underground nuclear explosion from an underground chemical explosion;

(3) to what extent an underground explosion can be distinguished from an earthquake;

(4) the number of earthquakes in the U. S. S. R. and China of a given magnitude occurring on an average each year;

(5) the type of inspection system necessary to assure that an agreement on nuclear test suspension was being observed; and

(6) the possibilities for evasion of a nuclear test moratorium.

Most scientists agree that it would be possible to devise an inspection system which would not be too elaborate and which would detect and identify surface and aerial nuclear explosions. Tests at very high altitudes constitute an unknown, but it is expected that a method of detecting them can be found. With respect to the detection of underground tests, however, there has been considerable controversy.

The questionnaire which appears below was sent by the chairman of the subcommittee in April 1958 to 42 eminent American seismologists as well as geophysicsts and geologists with experience in seismology. Of these, 31 submitted answers to the questionnaire; 4 others responded but did not feel that their experience was pertinent.

The replies of those who answered the questionnaire have been printed in full. They reflect the judgment of seismologists with a wide variety of experience. Some work with the Government in reading and interpreting seismograms from all over the world. Some are professors concerned with the theories of seismology. Some have been principally involved in applied seismology, for example locating

oil deposits or measuring the thickness of ice in the Antarctic Several have had access to classified data on nuclear tests, but most have not.

The questionnaire sent by the Disarmament Subcommittee to the seismologists is as follows:

B. Questionnaire on Seismic Detection of Underground Explosions

April 8, 1958.

1. To what extent have you personally studied seismograms from underground explosions?

2. Can you suggest detection techniques other than seismic that would be useful in detecting underground nuclear tests placed deep enough to prevent the escape of radioactive debris?

3. At what distances do you believe that an underground explosion occurring at an unknown time in an unknown place of equivalent yields of 1 kiloton, 10 kilotons, and 100 kilotons would be detected?

4. Under the circumstances of question 3 at what distances would the records be of sufficient quality to permit an accurate epicenter determination? How accurately would the time and location be determined?

5. At what distances would the records contain diagnostic information that would aid in distinguishing between an earthquake and an underground explosion?

6. What is the minimum number of stations that would be required to get an accurate epicenter location?

7. With this number of stations, do you believe that a detected event could be identified as a blast rather than an earthquake? If so, what features of the seismic wave enable you to make this identification? Further, could this identification be made on 100 percent of the disturbances located? 90 percent? 50 percent?

8. If the minimum number of stations required to locate accurately the epicenter is in your opinion not enough to provide identification, how many would you suggest to give a maximum chance of identification? Assuming this maximum number of stations is realized what percentage of natural earthquakes recorded would be correctly identified?

9. Do you believe that from seismic evidence alone you can determine unambiguously that an underground explosion has occurred? If so, under what circumstances?

10. Do you believe that from seismic evidence alone you can determine unambiguously that an underground nuclear explosion has occurred? If so, under what conditions?

11. Do you believe that the characteristics of a seismogram utilized for distinguishing between explosions and earthquakes would be affected by variations in the depth of the explosion, the nature of the surrounding strata, or the presence of absorptive or shielding materials designed to camouflage an explosion?

12. The underground explosion, Rainier, in Nevada (1.7 kilotons) produced seismic waves equivalent to an earthquake of magnitude 4.25. How many natural earthquakes occur in the U. S. S. R. and China of magnitude 4.25 to magnitude 6? How many larger than magnitude 6? What size explosion would produce a magnitude of 6?

13. To what extent is it easier to detect a nuclear explosion underwater than underground?

14. To what extent have you studied seismograms from underwater explosions?

15. If there were a worldwide suspension of nuclear weapons tests down to and including the level of 1 kiloton, at what locations throughout the Soviet Union and China as well as in other areas of the world where clandestine tests might take place should seismic stations be established in order to assure the maximum probability of detecting a violation of the test moratorium? What total number of seismic stations would be required? What would be the personnel requirements of this system? What percentage of the earthquakes normally occurring in these regions could be correctly identified? What is the probability of an explosion being incorrectly identified as an earthquake? How long would it take to install such a system? What type of seismometers would you recommend to be used? What would you estimate the cost of the system you have described? Would such a system be capable of identifying an underground explosion as a nuclear explosion?

16. In the system you have described in how many cases per year do you feel that the data from the system would leave unresolved the question of whether or not an underground explosion had occurred?

17. Do you believe that on-the-spot inspection teams directed to the area defined by your seismic system could locate and identify evidence of an undergound explosion? If so, do you believe that evidence of an underground nuclear explosion could be obtained by such an inspection team? About what area in square miles would the inspection team be required to search for each event? What types of evidence would the inspection team find useful in identifying an underground explosion?

18. If you were given the problem of determining a set of conditions under which an underground nuclear explosion could be carried out without detection by the inspection system described by you in questions 15 to 17, what procedures would you suggest?

19. What methods might be used to hide a test in the absence of such an inspection system? In the absence of seismic stations in the U. S. S. R. and China, do you believe that a deep underground nuclear test could be conducted in such a manner as to prevent our obtaining positive proof that a nuclear explosion had occurred if the yield were as large as 10 kilotons? As large as 50 kilotons? As large as 100 kilotons? As large as 1,000 kilotons? If your answer is negative, explain the nature of the data which you would consider adequate to prove the fact of a nuclear explosion.

C. Relationship of Seismology to Nuclear Test Suspension

Seismology is the science of earthquakes and other movements in the interior of the earth. It is among the youngest of the geophysical sciences. Only in the last 75 years have seismologists developed instruments, called seismographs, which could satisfactorily record ground movements. A seismograph is a machine which is erected on the surface of the earth and which is able to record on charts (seismograms) activity going on beneath the earth's surface. It records waves sent by earthquakes and other earth movements to the earth's surface.

DEFINITION OF PRINCIPAL SEISMIC WAVES

A brief explanation of the three principal types of waves recorded on seismographs serves as background to the answers of the respondents to several of the questions of the subcommittee.

"P" and "S" waves stand for "primary" and "secondary" in order of arrival on the earth's surface. However, a P wave is also described as a "push," "longitudinal," or "compressional wave." It is like a sound wave through the earth. An S wave is also described as a "shake," "transverse," or "shear wave"—the particles in its path move at right angles to the direction in which the wave is traveling, like a rope which is fixed at one end and shaken at the other.

Another important type of wave is the L wave group, also called surface waves, which travel around the outside of the earth instead of passing through the interior.

As a result of analyzing the various types of waves, a skilled seismologist can gain a great deal of information about earth disturbances. Data from seismographs can give the time of an earthquake, its location from the surface of the earth, its depth, and its size. There are today some 630 publicly known seismograph stations throughout the world. The map on page 651 shows their distribution and the accompanying list, assembled by geographical region, gives their location. The Department of Commerce's Coast and Geodetic Survey acts as the main agency in the United States which collects and analyzes seismographic data.

The seismographs vary considerably in their performance. Some, in private institutions, do not at present operate continuously. Others are kept in a constant state of efficient operation, although they vary in terms of sensitivity.

When the United States first began testing nuclear weapons, seismologists foresaw opportunities to increase their knowledge of the interior of the earth. The Bikini test of 1946 was recorded on seismographs in the United States. For a period, much information regarding tests was classified, and it has only been recently that seismologists have been given information regarding the details of tests and were able to compare these details with data recorded on seismographs. At the present time, the nature of some research done by the United States Government is still not available. The nonavailability of this data, or the requirement to keep it secret, has been cited by the respondents as a handicap in answering, fully, the subcommittee's questionnaire.

MEASUREMENTS FOR DETECTING TESTS

When it became known that the Soviet Union was about to experiment with nuclear devices, the United States set up a system to try to detect Soviet tests. This system has operated now for 10 years, and its capabilities have been considerably improved. It should be noted that this system does not operate in Communist areas at present.

There are four types of measurements which yield information on nuclear-weapons tests: Collection and analysis of radioactive debris from tests, recording and analysis of electromagnetic (radio) waves, recording and analysis of acoustic waves, and recording and analysis

of seismic waves. It was stated earlier that, because underground tests constitute the greatest problem of detection, and because seismic instruments are thought to be the only means of detecting underground shots, the Disarmament Subcommittee restricted its questionnaire to the compilation of information from seismologists.

The summary that follows, except in those instances where there was wide agreement among the respondents on a specific point, has been footnoted so that the opinion of the authority cited can be traced to its original context.

NEED FOR ADDITIONAL RESEARCH

In many answers, a great deal of stress was placed on the fact that there had been comparatively little experience with the specific problem of detecting and identifying explosions originating at an unknown time and place. Some seismologists referred to the fact that only 1 underground nuclear explosion had been detonated (the Rainier shot of 1.7 kilotons exploded in Nevada on September 19, 1957) and that, therefore, it was difficult, if not impossible, to generalize from such meager evidence. Other seismologists, however, pointed to analysis of surface nuclear and chemical explosions, underwater nuclear and chemical explosions, and underground chemical explosions as constituting additional data which were relevant in answering the subcommittee's questions.

Some seismologists expressed confidence that, with additional research, better interpretation of seismic records could be made or instruments particularly suited to the detection of underground tests could be developed.[1] It was stated that modern instrumentation would make it possible to detect and identify events at much greater distances with fewer stations than at present.[2] Several suggested that, with a well-planned series of underground explosions, of various sizes and under diverse conditions, predictions of the range of detectability and of correct identification could be established with greater accuracy than was now possible.

DEPENDENCE ON SEISMIC MEASUREMENTS

The seismologists were in agreement that the detection of underground explosions is dependent on seismic methods. None of the seismologists knew of any scientific detection techniques, other than seismic, which would be practical to use in detecting underground explosions which were contained, that is, placed deep enough to prevent the explosion from blowing out to the surface and thus permitting the escape of radioactive debris, if it was nuclear. Several mentioned that underground explosions, since they might produce a sudden rise of the ground surface over a large area, might result in acoustic waves which would be discernible at short distances.[3] Another suggested that the study of telluric currents (natural electric currents that flow on or near the earth's surface in large sheets), and seismoelectric effects (phenomena caused when a seismic wave passes between two electrodes), might produce evidence of an explosion.[4] However, for the time being, it seems clear that the burden of detect-

[1] Howell, Leet, Linehan.
[2] Leet.
[3] Bailey, Carder, Poulter, Romney.
[4] Linehan.

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ing and identifying underground explosions will depend upon the ability of seismographs to record underground explosions and the ability of seismologists to interpret the records correctly.

D. Detection of Underground Explosions

DISTINGUISHING BETWEEN NUCLEAR AND CHEMICAL EXPLOSIONS

The replies reflected almost complete agreement that it was not possible, from seismographic evidence alone, to determine that an underground explosion had been a nuclear explosion and not chemical. If there is no qualitative or unique way of distinguishing nuclear from chemical underground blasts, this would appear to substantiate the opinion of those who say data from chemical explosions are pertinent to the problem of detection. Some seismologists indicated that the size of the explosion might give a clue as to its nature. For example, a very large explosion would, almost certainly, be nuclear, it was claimed. (The largest known manmade chemical explosion, according to one respondent, was the equivalent of 4 kilotons of TNT.[5]) One correspondent believed that experience might provide a method of differentiating the seismograms of chemical and nuclear explosions.[6] Another pointed out that, if there was a difference, it would depend on the short duration of the nuclear explosion as compared to a chemical explosion.[7] Another felt confident that a differentiation could be made with modern equipment, if the explosion were larger than 1 kiloton.[8]

DETECTION OF UNDERWATER EXPLOSIONS

Most of the seismologists who have had experience with underwater explosions believed that underwater shots, especially deep ones, were much easier to detect and identify than underground explosions. Operation Wigwam, an underwater nuclear explosion off the coast of California in 1955, was frequently cited as indicating this. Reasons given included:

1. In underwater explosions, seismic waves of large amplitudes are excited because a greater fraction of explosive energy goes into seismic waves than in underground shots, and, in addition, a sound wave of great amplitude is set up.
2. In underwater explosions, the compressional (P) and shear (S) types of body waves have a unique and characteristic appearance, which would not be confused with the same waves from an earthquake.
3. At one specific layer in the ocean at about 700 fathoms, called the sofar layer, sound waves are transmitted huge distances, and a deep underwater nuclear explosion would produce compressional (P) waves in this sofar layer.
4. Methods other than seismic, such as measurement of radioactivity, might be used for underwater shots.
5. Peculiar afterwaves are set up by an explosion in deepwater.

However, it was cautioned that a nuclear explosion buried under the bottom of a body of shallow water, if completely tamped (that is,

[5] Raitt. However, there are reports in journals of the U. S. S. R. to the effect that an explosion, presumably chemical, has been conducted in China with a force of 9,000 tons.
[6] Walter.
[7] Richter. See also Knopoff.
[8] Leet.

the drill hole filled up with clay or earth), would be equivalent to an underground explosion. and would be much more difficult to investigate.[9]

DETECTION OF UNDERGROUND EXPLOSIONS

There seemed to be no doubt that an underground nuclear explosion would produce waves which, at distances varying according to the size of the explosion and other factors, could be detected on seismographs. There is considerable difference of opinion, however, on the distances at which explosions could be detected and whether, from the recordings alone, it would be possible to identify a detected event as an explosion rather than an earthquake.

The seismologists were asked the distances at which they believed underground explosions of 1, 10, and 100 kilotons, occurring at an unknown time and place, could be detected. Estimates for the distance at which a 1-kiloton underground explosion could be detected ranged from tens of miles to several thousand miles, with most of the estimates between 250 and 850 miles. Estimated distances of detection for a 10-kiloton blast ranged from 500 to 5,000 miles, and for a 100-kiloton blast from 1,500 miles to any distance. Several pointed out that this distance would depend on many variable factors, such as the geological structure of the explosion site, the background noise at the recording station, and the type of seismographic instruments used.

The replies reflected a slightly narrower range as to the distance at which the quality of records received would be good enough to locate the event accurately in terms of time of occurrence and specific geographical site. For a 1-kiloton explosion, the distance ranged from 150 to 2,100 miles, with most of the estimates clustered between 150 and 600 miles. The distance at which a 10-kiloton explosion could be accurately located was estimated at 500 to 5,000 miles, with most of the estimates between 600 and 2,000 miles. For a 100-kiloton explosion, the maximum distance for location was estimated from 665 miles to any distance. Of the 13 who estimated specific distances, 2 estimated below a thousand miles, 5 estimated between 1 and 3,000 miles, and 6 estimated farther distances.

It was generally agreed that the determination of the time of the event would be accurate to within a few seconds or less. The accuracy of the location, it was pointed out, would vary with the number of stations from which adequate records were available. Most of the respondents believed the event could be located to within 5 to 10 miles.

The number of stations which would be necessary to locate the event was usually described as 3, 4, or 5 at a minimum, but several stated that confidence in the accuracy of the location would increase with the number of stations and that, for practical purposes, approximately 10 stations, in various directions from the site, would be required.

E. The Problem of Earthquakes

If explosions were the only events being recorded by seismographs, a nuclear explosion of even 1 kiloton would stand out as an event of great force in comparison to quarry blasts and most other detonations

[9] Press, Romney.

of high explosives. However, each year there are several hundred thousand earthquakes, the events which seismographs were developed to measure, at various locations throughout the earth. Since some observers claim that earthquakes can easily be confused with explosions on seismographs and, therefore, would impede the seismological detection and identification of them, the subcommittee asked for information on the number of earthquakes occurring in the Soviet Union and China of various sizes.

In order to measure the strength of earthquakes, seismologists have devised a scale [10] divided into units of magnitudes ranging from 0 for the smallest earthquakes, to 8.5 for the largest earthquakes. The magnitude is the figure used to describe the total energy of the shock of an earthquake.

By using this scale seismologists have been able to compare the size of earthquakes throughout the world. As manmade explosions have occurred seismologists have applied the magnitude scale to them for purposes of measurement. For example, the United States underground nuclear explosion (Rainier) exploded in Nevada, September 1957, was computed as having a magnitude of 4¼ on the Richter scale. Some seismologists, however, hold that the magnitude scale was devised for measuring earthquakes and is not applicable to the measurement of explosions.[11]

The size of an explosion which would cause a recording of magnitude 6 was variously estimated at 44 kilotons,[12] 100 kilotons,[13] 500 to 1,000 kilotons,[14] 1,000 kilotons,[15] or even 2,000 kilotons.[16] However, it was pointed out that the earthquake equivalent of an explosion would depend on a great many factors which influence how much of the energy of the explosion was transmitted. At least one seismologist took the view that the relationship between the size of an explosion and the earthquake-magnitude it would record had not yet been experimentally established.[17]

NUMBER OF EARTHQUAKES IN THE SOVIET UNION AND CHINA

Figures on earthquakes cited by the seismologists varied considerably. Estimates for the total for the Soviet Union and China between magnitude 4¼, the magnitude of the Rainier underground shot, and 6, the magnitude of an earthquake which would be destructive over a restricted area, ranged from 50 [18] to 2,000.[19] Mr. Gutenberg, one author of Seismicity of the Earth, the source cited in many of the replies for information on the number of earthquakes throughout the world, estimated that within the range of magnitude mentioned there would be 200 in the Pacific Belt of the Soviet Union each year and 100 in the interior of the Soviet Union and China, although the number could vary greatly from year to year. Mr. Richter, the other author, estimated 200 in the Kuriles and Kamchatka, and 45 in the interior of the Soviet Union and China between the magnitude of 4¼ and 6.

[10] The scale was originated by Prof. C. F. Richter in 1935.
[11] See Gutenberg, Richter.
[12] Beers.
[13] Ewing, Oliver, and Wilson.
[14] Richter.
[15] Bailey.
[16] Walter.
[17] Romney.
[18] Walter.
[19] Heroy.

Other estimates were 140 and 200,[20] 300 for the U. S. S. R. alone,[21] 500 to 1,000,[22] 600 (100 in the U. S. S. R. and 500 in China) [23] and 1,000.[24] Some of the differences in these estimates may be accounted for by the fact that some have considered only land areas, while others have also included nearby oceanic areas under Communist control.

Estimates for the number of earthquakes above magnitude 6 for both the Soviet Union and China ranged from 4.3 to 100 or more. Mr. Gutenberg estimated 20 in the Pacific Belt and 5 in the interior of the Soviet Union and China. Mr. Richter estimated 3 in the Soviet Union proper, 20 in the Kuriles and Kamchatka, and 1 or 2 in China. Most of the other estimates were also in the range of 10 to 25. One, however, estimated 50 [25] and 2 estimated 20 to 50 in the Soviet Union and 50 to 100 in China.[26]

DISTINGUISHING EXPLOSIONS FROM EARTHQUAKES

Most answers reflected apparent agreement that there is diagnostic information in seismograms which would aid in distinguishing earthquakes from explosions. However, there was a wide range of opinion on the reliability of this diagnostic information and the distances at which this diagnostic information would appear. One who had studied records of the Rainier explosion received at 200 miles said that he saw nothing in the records which indicated anything other than an earthquake.[27]

Different features of the seismic waves produced by earthquakes and explosions to aid in identifying and distinguishing between the two events were cited. Frequently mentioned was the direction of the first motion of the signal. It is commonly thought explosions produce compressional waves which record an upward first motion in all directions from the source, while earthquakes usually produce compressional waves in some directions and rarefactions, which record a downward first motion, in others. Therefore, if clear records are received from stations surrounding the site of the event, it would be identified as an earthquake if some of the stations recorded rarefactions. If no rarefactions were recorded, then the event may have been a blast.

The following distinguishing characteristics were among others pointed out: (1) a blast produces a greater percentage of surface (L) waves compared to body waves (P and S) than an earthquake, and the S waves from an explosion have smaller amplitudes relative to the P waves as compared to the amplitudes of the corresponding waves from earthquakes. (2) Explosions produce compressional seismic waves of very high frequency compared to earthquakes. (3) The times of arrival of the signals at near and far stations reveal if the source was at or near the surface, and earthquakes usually are deeper than explosions. (4) An explosion has a point source whereas an earthquake has an extended source and the overall duration of the disturbance is less for dynamite blasts than earthquakes.

[20] Haskell and Carder.
[21] Murphy.
[22] Bailey.
[23] Ewing and Oliver.
[24] Romney.
[25] Carder.
[26] Ewing and Oliver.
[27] Tocher.

Opinions differed as to whether from the evidence furnished by the seismograms alone it could be determined unambiguously that an explosion rather than an earthquake had occurred. While some did not believe this was possible, a few thought it could be done now,[28] under certain circumstances, such as if the records were sufficiently distinct from the general noise level. Several suggested that additional experience was necessary and expressed confidence that with continued research, it would be possible to distinguish between earthquakes and explosions.[29]

Several expressed the viewpoint that distinguishing between earthquakes and explosions would not be a problem with large underground explosions. For example, one said that it would be possible to identify unambiguously 90 percent of the blasts above 20 kilotons and with research this size could be lowered to 10 kilotons.[30] Another stated that an explosion larger than 10 kilotons should produce strong first-motion signals which would indicate an explosion. Others believed that unambiguous identification would be possible when the explosion occurred in nonseismic areas, that is to say areas devoid of earthquakes. For small explosions, however, especially if fired in seismic areas, there was considerable disagreement.

Several expressed the belief that with an adequate number of seismic stations it would be possible to identify 90 percent of the earthquakes correctly, at least in quiet areas. Some took the view that in seismic areas the percentage of earthquakes which could be correctly identified would be lower. One expressed the belief that given optimum detection characteristics a system could be devised which would be capable of identifying 100 percent of the earth disturbances.[31]

Some felt that the percentage of correct identification would increase with the number of stations, so the more stations the better.[32] However, others felt that increasing the number of stations beyond a certain point would not help, that 8 or more stations could make unambiguous identification if the quality of the instruments used and the records obtained were high enough.[33]

Many believed that a single station would not be enough to distinguish an earthquake from an explosion, but by establishing a grid of stations and examining several recordings of the same event, the nature of the event could be determined. Some appeared to believe that less important than the number of stations was that they be located in different directions from the possible test site.

Most, but not all, of the respondents believed that the characteristics of the seismograms might be affected by the depth of the explosion or the surrounding strata. However, there was a difference of opinion as to whether these effects would make it possible to utilize the surrounding strata in such a fashion as to mask a shot from an inspection system. Some did not believe shielding by artificial means, or burial of the shot to the depth necessary to hide it from an inspection system, would be possible, or at least practical.[34]

[28] Beers, Leet, Lepp, Walter.
[29] Evernden, Heinrich, Howell.
[30] Press.
[31] Beers.
[32] Gutenberg, Press, Richter, Walter.
[33] Leet, Nuttli.
[34] Haskell, Heroy, Press. See replies to questions 11 and 18.

DISTANCES AT WHICH EXPLOSIONS CAN BE DISTINGUISHED FROM EARTHQUAKES

The seismologists were asked at what distances would explosions of various sizes contain diagnostic information which would aid in distinguishing them from earthquakes.

Many of the respondents took the position that whether or not this vital distinction could be made depended primarily on the quality of the seismographic record rather than on the distances involved, although the quality might be better at closer stations.

One seismologist took the view that it was much more difficult to differentiate between earthquakes and explosions at near distances than at distances several thousand miles away because at large distances a shear wave does not appear on the record of an explosion.[35] This would assume that the explosion could be recorded at these distances.

Of those who stated the distances at which the seismogram of a 1-kiloton explosion would contain diagnostic information which would aid in distinguishing it from an earthquake, one said 150 miles, three gave estimates in the 200 to 400 mile range, one estimated 300 to 600 miles, and one estimated 2,100 miles. For a 10-kiloton shot one said 460 miles, one estimated 1,000 miles, one 1,500 to 3,000 miles, and one 4,500 miles. For a 100-kiloton explosion, one said 300 miles, one said 3,500 to 6,500 miles, one said 9,700 miles, two said at all distances.

F. Requirements of an Inspection System

Number of stations.—The seismologists were asked to suggest a system of seismic stations which should be established to assure the maximum probability of detecting a violation of an international agreement to suspend nuclear tests of 1 kiloton or more. Most of those who replied to this question recommended that seismic stations be placed a few hundred miles apart. The recommendations ranged from 50 to 700 miles, with many pointing out that in seismic areas the spacing should be closer together than in nonseismic areas. The estimates of the number of stations necessary in the Soviet Union ranged from about 40 to about 200. Several estimated 100 stations. One believed only a "modest array" would be necessary and another believed it would be possible to detect underground explosions of the size of Rainier (1.7k) or substantially lower with a network of stations outside of the U. S. S. R., but not necessarily including Iron Curtain countries.[36] One suggested that instead of having a large number of stations, it would be better to have a small number of mobile stations capable of shifting at a moment's notice.[37] One suggested that the numerous seismic stations already in the Soviet Union be utilized.[38] (See map.)

One respondent answered the question on number of stations required and the distances they should be apart by saying: "If (my) 'pessimistic' estimate of a 550-mile identification radius is accepted and it is required that all points within the U. S. S. R., including adjacent Arctic islands, and China be within 550 miles of at least

[35] Nuttli. See replies to question 5.
[36] Tuve, Benioff.
[37] Poulter.
[38] Gutenberg.

3 seismic stations, it would require about 73 stations distributed at 550-mile intervals to give complete coverage of the area. If (my) 'optimistic' estimate of 1,100-mile identification radius is accepted, the number of stations required would be reduced to about 26." [39]

Personnel.—Only a few suggested specific numbers of personnel that would be required to operate the seismic stations. One person who had suggested the need of one or two hundred stations suggested 300 to 600 personnel would be needed.[40] Another suggested 5 personnel for each station plus 250 analysts for the entire system.[41] One who advocated 100 stations suggested 100 full-time personnel plus 50 to 100 part-time.[42] One believed this would constitute a drain on trained personnel. Another suggested there would need to be 1 attendant at each station plus maintenance crews for a group of 5 to 7 stations.

Time period.—There was general agreement that it would take at least a year to recruit and train personnel and install the necessary equipment, and several believed it would require 2 years, even on a crash basis, because the manufacture of the equipment and its delivery would require at least a year.

Types of seismometers.—Several types of seismometers, both long period and short period instruments, were recommended for each seismic station. The instruments most frequently mentioned were the Benioff variable reluctance short period seismometer and the Press-Ewing long period type. Also mentioned were the Willmore type, which one seismologist suggested could be concealed near possible sites and the Reeff type used at St. Louis University.

It was pointed out that new instruments for this specific purpose might be developed and that some further testing was required to determine the best type of instrument. One expressed the opinion that the ultrashort period seismic level recorder of the University of Michigan Engineering Research Institute showed great promise but needed more development and testing.[43] A seismologist from the University of Michigan described a seismic level recorder as a device to record a running average of the ground amplitudes and said it obtained some "interesting but controversial records" of the Rainier shot.[44]

Cost.—The cost of each inspection station was estimated at $50,000,[45] $100,000,[46] and $150,000.[47] Seismologists who gave their estimates in terms of costs of the total system necessary to assure the maximum probability of detecting and identifying 1-kiloton tests estimated from $5 million [48] to $100 million.[49] In between these 2 outside figures were estimates of $10 million,[50] $10 million to $20 million,[51] $25 million to $50 million,[52] and $50 million to $100 million.[53]

[39] Haskell.
[40] Bailey.
[41] Heroy.
[42] Press.
[43] Bailey.
[44] Wilson.
[45] Romney.
[46] Bailey.
[47] Linehan.
[48] Walter.
[49] Benioff.
[50] Press.
[51] Carder and Murphy.
[52] Heroy.
[53] Ewing and Oliver.

Some commented that the cost of the system would be "out of proportion with results you could expect" [54] and "prohibitive," [55] while others believed it would be "much less than that of continuing bomb tests." [56]

G. Capabilities of Inspection System

The seismologists were asked to estimate the capabilities of the inspection system they had described. Their replies to this question are summarized as follows: [57]

Differentiation between nuclear and chemical explosions.—The large majority of the respondents thought that the inspection system of seismographic stations each had described would not be able to distinguish between underground nuclear and underground chemical explosions. Other means of identification and investigation would need to be devised to make this determination if the size of the explosion indicated it could be either nuclear or chemical.

Correct identification of earthquakes.—Most of the seismologists believed that about 85 to 90 percent of the earthquakes which occurred in the region of the inspection system would be correctly identified as earthquakes. The range of correct identification was from 75 to 100 percent.

A seismologist calling for 40 to 50 stations in the Soviet Union and 50 to 60 elsewhere estimated about 95 percent of the earthquakes could be correctly identified with that system.[58] One who called for 100 stations believed these stations could identify nearly all earthquakes in seismic areas and 75 percent of them in nonseismic areas.[59] One who recommended 50 stations in the Soviet Union believed that 90 percent of the earthquakes could be identified as such.[60] Two others also estimated that an 80 to 90 percent capability could be achieved.[61] One believed that 26 stations properly spaced in the U. S. S. R. could correctly identify 90 percent of all earthquakes of magnitude 4.3 and that 73 stations could correctly identify 90 percent of all earthquakes down to a magnitude of about 3.7.[62] One expressed the belief that with efficient operation the ability to correctly identify earthquakes should gradually improve to nearly 100 percent as a result of identifying persistent earthquake sources.[63]

Each seismologist also estimated the number of cases per year that the data from the inspection system would leave unresolved the question of whether or not an underground explosion had occurred. This was estimated at 5 to 25,[64] 100 to 200,[65] 300,[66] and "less than 10 percent." [67]

The probability of an explosion being incorrectly identified as an earthquake was discussed by the seismologists. Most believed there was a risk that an explosion would be identified as an earthquake

[54] Poulter.
[55] Evernden.
[56] Richter.
[57] See replies to questions 15, 16, and 17.
[58] Heroy.
[59] Carder.
[60] Romney.
[61] Ewing and Oliver.
[62] Haskell.
[63] Richter.
[64] Oliver and Ewing.
[65] Heroy.
[66] Romney.
[67] Linehan.

but that with the inspection system this would be a 10 to 20 percent chance. One felt that with 100 stations in the Iron Curtain area, in a nonseismic area approximately 10 percent of the explosions might be incorrectly identified, and in a seismic area 25 to 30 percent.[68] Another estimated 10 percent [69] and 3 mentioned a 10 to 20 percent chance.[70] One said merely that for small explosions confusion was certainly possible. For large explosions the problem was considered much simpler. One estimated that there was less than a 5 percent chance that a 20 kiloton explosion would be called an earthquake.[71]

One commented that no system was absolute,[72] and another said: "Unless some means is found for remotely detecting underground explosions which is more reliable than seismic, it will be surprising if most of them do not go undetected."[73]

Inspection teams.—It has been proposed that on-the-spot investigations be made to resolve those cases in which the seismic inspection system could not identify positively an event as being an earthquake. Therefore the seismologists were asked to estimate the distance such teams would have to search and to describe what sort of evidence they should look for.

The area which such teams would have to cover was most frequently estimated as 10 square miles,[74] but some estimated in the 25-mile range,[75] two estimated nearly 100 square miles [76] and one estimated 300 square miles although he stated this could be reduced.[77] The existence of fresh radioactive debris would constitute proof that an underground nuclear explosion had been detonated, according to the seismologists. Other evidence which it was believed might be helpful to investigation teams would be: (1) The melting of the permafrost, the permanently frozen subsoil in cold areas, as a result of the heat from an explosion; and (2) signs of preparations for an underground test, such as evidence of digging, drilling, or tunneling.

Detection methods suggested were: Seismic reflection survey drilling;[78] radiometer measurements of the area, particularly of air joints and other openings in rocks, plus measurement of the thermal gradient;[79] observance of possible radial fracture patterns [80] and normal detective methods.[81] One mentioned that the right to inspect suspected sites would deter attempts to evade,[82] and another expressed the belief that the probability of detection would be so great that it was virtually certain that no country which wanted to continue tests would permit the monitoring stations or the right of on-the-spot inspection.[83] One believed that it would "be very difficult to locate an underground source if a careful attempt had been made to conceal it . . . Our own tests in Nevada proved this." [84]

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[68] Carder.
[69] Heroy.
[70] Ewing, Oliver, Romney.
[71] Press.
[72] Benioff.
[73] Poulter.
[74] Ewing, Knopoff, Murphy, Oliver, Raitt.
[75] Bailey, Carder 15 to 25 square miles, Press.
[76] Haskell, Walter.
[77] Heroy.
[78] Oliver.
[79] Lepp.
[80] Donn.
[81] Richter.
[82] Press.
[83] Raitt.
[84] Howell.

H. Camouflaging Explosions

With inspection.—The seismologists were asked to discuss the means by which explosions might be camouflaged with the operation of the inspection system they described, and thus secretly conducted in violation of a test moratorium.

The method most frequently suggested for attempting to evade an agreement to suspend tests was to conduct the test in a highly seismic area in the Soviet Union, such as the Kamchatka-Kuriles area. One seismologist expressed the belief that with stations 50 to 100 miles apart, a contained underground explosion could still be hidden in Kamchatka.[85] Several suggested timing the test to coincide with an earthquake, by triggering the test by a strong-motion seismograph as it registered an earthquake above a certain size.

Others suggested conducting tests in such a way as to confuse the seismographic records. Among the methods suggested by which this might be done were firing several shots simultaneously or in rapid series, generating seismic noise, firing in a season of heavy storms, having a nonnuclear explosion 2 seconds earlier 5 miles away,[86] trying to shape the explosion so that it would look like an earthquake, and firing it in a well drilled under a shallow sea.[87] Many suggested that explosions should be kept small. A few suggested shooting in absorbent material such as thick ice in Antarctica or in dry volcanic tuff.[88]

Some seemed more concerned with the necessity of hiding the surface effects which might indicate to the inspection teams that an underground test had been conducted. They suggested using abandoned mines or else disposing of excavation material in rivers or lakes, or conducting the test near normal mining activities so that the excavation of the test site would not arouse suspicion.

Without inspection.—It was indicated that in the absence of an inspection system the same general methods of attempting to hide tests could be attempted. At the present time, with no inspection stations inside the Soviet Union available to the outside world, most of the seismologists believed that a 1-megaton test could probably not be hidden. One seismologist, however, believed even a 1-megaton test could be hidden by a large earthquake.[89] Another pointed out that underground explosions in the 50- to 100-kiloton range would be detected half the time by existing stations.[90] One doubted that an explosion greater than 50 kilotons could be contained underground—that is, it would blow out to the surface.[91] While some thought it was "not likely" that a 50 to 100 kiloton explosion could be successfully hidden or that a "good percentage would be detected," others stated much the same view more negatively, saying they "could be hidden some of the time" or that there was very little likelihood of detection if it occurred in a seismic area during an earthquake season.[92]

[85] Bailey.
[86] Richter.
[87] Romney.
[88] See replies to question 18.
[89] Bailey.
[90] Carder.
[91] Heroy.
[92] See replies to question 19.

One believed that rather than use hypothetical information some controlled experiments should be conducted to find out the limits of detectability for various ranges.[93]

One believed a detection system not requiring stations in the Soviet Union could be devised to detect 10-kiloton underground tests.[94] Another believed that in a nonseismic area a 10-kiloton test could be identified "nearly all the time," [95] but in the seismic areas tests might go undetected half the time but at least 1 or 2 would be positively identified. Several expressed the view that in the absence of an inspection system a 10-kiloton test could be hidden [96] or might possibly be hidden.[97]

One seismologist did not believe it would be possible to prove the fact of a small nuclear explosion beyond a reasonable doubt,[98] and another was not sure whether tests could be proved by records from distant stations only. One believed the only positive proof a nuclear explosion had occurred would be soil samples showing fissionable material.

[93] Donn.
[94] Beers.
[95] Carder.
[96] Ewing, Heroy, Oliver, Richter, Worzel.
[97] Walter.
[98] Gutenberg.

II. REPLIES OF SEISMOLOGISTS

NOTE: The questions have not been repeated, but may be found on page 502.

Reply of Leslie F. Bailey, Seismologist, Coast and Geodetic Survey

MAY 15, 1958.

1. I have personally studied seismograms from Rainier as recorded at 38 stations in continental United States and Alaska. These records were examined for first motion of the compressional or P waves, for presence of transverse and surface waves.

2. Other detection techniques include high frequency acoustic wave detection for shallow buried nuclear test. Shock waves generated by the explosion of Rainier caused the surface to rise several inches. This causes a compressional wave to be generated in the atmosphere. This wave has a frequency so high that it would tend to be lost in ever present high frequency acoustic noise background except at distances of a few miles.

3. Assuming a very quiet station location, microseismic noise background normal for the station, no local or regional earthquake recording at the time of recording of the explosion, I would estimate that a 1 kiloton buried device could be detected at distances up to about 500 miles, a 10-kiloton to 2,000 miles, or 100-kiloton buried device would be detected at any distance. With much noisier station locations, detection would become more difficult and the above distances would be drastically reduced. I am thinking here of the capabilities of short period Benioff variable reluctance vertical seismographs with seismometer period of 1 second and galvanometer period of 0.2 second.

4. In the case of the 1-kiloton contained explosion, I would expect the records to be of sufficient quality for accurate epicenter determination up to 150 or 200 miles, assuming a sufficient number of stations at quiet locations, operating normally at high sensitivity and without earthquake interference. At these distances the first motion would be no problem assuming the above conditions, allowing accurate epicenter determination. A 10-kiloton contained explosion could be accurately located at distances up to and beyond 25° epicentral distances, with above conditions satisfied. A 100-kiloton contained explosion could be accurately located at distances up to 90°, the above conditions being satisfied. The accuracy of time and location is a function of the accuracy of time control and drum rate of recorder, quality of trace, signal to noise power ratio, experience of personnel reading the seismograms, and precision of computational procedures adopted in making the epicentral determination. Standard errors of station readings from Pacific sources are given in "Seismic Wave Travel Times from Nuclear Explosions" by Dean S. Carder and Leslie F. Bailey to be published in Bulletin of the Seismological Society of America in the fall of 1958. First class stations in Western United States have standard errors from megaton explosions at

Bikini of 0.1 to 0.3 seconds. Taking a standard error of 0.2 seconds as average for presently achieved quality of chronometer and drum rate and an apparent velocity 6.0 seconds per degree near 70° epicentral distance the readings from a single station will indicate epicentral distance with a standard error of 2 nautical miles on the average. The meantime anomalies for these stations vary from 0.7 seconds for Reno to −0.5 seconds for Isabella, both of which are more than 3 times their standard errors (0.13 for Reno, 0.08 for Isbella) and so are to be considered statistically significant. If a new surveillance net is to be established to monitor underground nuclear tests, these anomalies would have to be determined for each station before the precision estimated above could be taken as nearly equal to the effective accuracy of location. Next, assuming that reliable meantime anomalies were previously determined and then applied in the computational procedure, the standard error of an epicentral location varies as the reciprocal of the square root of the number of stations of this quality surrounding the epicenter. In the above case, for a standard error of 2 nautical miles, good records from 12 stations symmetrically placed about the epicenter would reduce the standard error to about 1 mile. The above discussion assumes that we know the travel time to working distances to a high degree of precision. At present we know the travel times of P moves more accurately than those of any other phase. Due to variations in the thickness and velocity of the layers of the earth's crust, there is some variation in the travel time curve from one locality to another. We are able to determine it with a standard error of 1 or 2 tenths of a second for any locality if we have enough stations of high quality in that area recording several earthquakes or explosions within a few hundred miles of these stations.

5. Direction of first motion on the vertical component is perhaps the most important diagnostic information which may be obtained. If the signal to noise power ratio at the beginning of the P phase is 10 or more to 1, the first motion is quite reliable. If this ratio is only 2 or 3 to 1, first motion estimates are of little value. This is true at any distance. At 40° to 60°, the interval PcP–P is 0.4 to 0.3 seconds longer for surface focus or buried explosions than for earthquakes at 33 kilometer depth, according to the Jeffrey Bullen Seismological Table of 1948. This has the advantage that the ray paths are so nearly vertical that the effect of variation of crustal structure tends to cancel itself out. On the other hand, PcP is not often identified with the accuracy required by this method. If the distance to the station is similar, seismograms of earthquakes have nearly the same distribution of energy with frequency as those of underground nuclear tests such as Rainier. Blasts are not identifiable on a seismogram as high frequency waves riding on low frequency waves on earthquake origin if both are at nearly equal epicentral distance from the station. Spacing of stations would have to be of the order of depth of focus to use the California Institute of Technology point of inflection method to distinguish very shallow earthquakes from blasts.

6. As indicated in the answer to question 4, the standard error of epicentral location varies as the reciprocal of the square root of the number of reliable stations surrounding the epicenter. I use the word "surrounding" advisedly because the quality of location may be demonstrated to be much lower if the stations are all on one side of

the epicenter. If all but one are on one side, the single station on the opposite side carries too much weight, and an error in identifying the correct arrival time at that single station will go unchecked by discrepancies with other stations on that side of the epicenter. The latitude, longitude, origin time, and depth of focus are parameters which must be computed from arrival time data in accurate work. Four stations are the absolute minimum required to obtain a unique solution for the above four parameters. To obtain an estimate of accuracy which is reliable, several more degrees of freedom are necessary for statistical least square computation. This implies good quality readings at several stations. The minimum number which you require is a function of: (*a*) Station location and spacing, (*b*) background noise and earthquake interference at the time of the recording, (*c*) the accuracy of timing ,interpretation and computation, (*d*) accuracy of determination of the local and regional travel time curve. Eight to twelve recording stations would give good control if they are distributed in all quadrants about the epicenter.

7. A detected event could be identified as a blast if the signal to noise ratio is sufficiently high at several stations. This identification would not be unambiguous. However, if several stations surrounding the shot point recorded compressional first motion in the P phase with a high signal to noise ratio, the ratio of the amplitude of first motion to average amplitude of P phase should be more nearly constant for blasts than for earthquakes. Stations at quiet locations spaced 50 to 70 miles apart would be close enough to give this type of information except during the P and S phases of large earthquakes within 15° of the station.

With stations at these distances, high pass electrical filters may be used to emphasize frequencies of about 40 cycles per second which are high enough to show nearby surface reflections from buried shots. This is the pP phase of earthquake seismology, which will be seen within the first quarter of a second of the P phase for a buried shot. Without high pass filters, the pP phase will be invisible in the P group. This phase must be identified consistently on several station records before it can be used for blast identification.

In quiet locations as in Central Asia, perhaps 90 percent could be identified in one of these ways. In noisier areas as on Pacific islands, 50 percent would be much too optimistic a figure.

8. The chance of identification increases with the number of stations. Maximum chance of identification implies maximum number of stations. This is limited by available trained personnel, equipment, supply facilities, operating funds, etc.

Natural earthquakes will form well over 95 percent of all seismic events recorded excluding noise from such sources as traffic, trees, lakes, and microseisms from the ocean. The problem is to correctly identify blasts. The proportion of blasts correctly identified will depend upon the station spacing and upon the quality of the sites of the stations within recording distance. This assumes that no artificial absorptive or shielding devices are employed.

9. No.

10. No.

11. Yes

12. About 10 to 20 earthquakes per year of over magnitude 6 occur in the U. S. S. R. and China each year, excluding such heavy aftershock sequences as that of Kamchatka, which cannot properly be averaged on an annual basis. The whole earth has about 135 per year over magnitude 6. Assuming the same ratio to hold for those below magnitude 6, about 500 to 1,000 per year should be between magnitude 4.25 and magnitude 6, in U. S. S. R. and China.

Using the equation $\log E = 9.4 + 2.14\ M - 0.054M^2$ it would require an explosion of about 1,000 kilotons to produce a magnitude of 6.

13. A nuclear explosion under water produces compressional waves in the "sofar" layer of the ocean which then carries to great distances (several thousand miles) with low attenuation. If a bubble of radioactive material rises to the surface from the nuclear explosion, this may be monitored with presently existing equipment.

14. I have studied the Benioff vertical seismograms on which the Bikini "Baker" test was recorded, as well as a few of those from "Wigwam."

15. Stations should be placed 50 to 100 miles apart in highly seismic areas, such as Kamchatka and the Kuriles. Wider spacing is justified in areas of low seismicity. Stations sites should be pretested if possible, to find the most quiet location. Perhaps 100 or 200 stations would be sufficient for the accuracy of determination required. Perhaps 300 to 600 men would be required to operate and maintain these stations. Over 95 percent of the earthquakes would be correctly identified merely by calling every seismic event an earthquake because the number of earthquakes in active seismic areas is much larger than the number of explosions, even during an intensive test program. With 50 to 100 miles separation, contained underground explosions could be hidden in highly seismic areas such as Kamchatka.

The length of time required to install a surveillance system would depend upon the number and type of instruments at each station, manufacturing facilities available, trained personnel available, et cetera. Perhaps 2 years would be a reasonable estimate.

Matched three component Press-Ewing long period and short period Benioff instruments should be installed at each station to check the energy ratios between P and surface wave groups, and make first motion determinations. The ultrashort period seismic level recorder of University of Michigan Engineering Research Institute shows great promise but needs more development and testing. The cost would be in the neighborhood of $100,000 per station, including buildings and instruments.

A net such as this could identify explosions but not nuclear explosions as such. It would be highly probable that any explosion with over one megaton of energy would be nuclear.

16. The number of cases per year which would go unresolved would be the number of earthquakes of magnitude appreciably greater than the largest nuclear test expected, assuming earthquakes are used for concealment.

17. If the explosions were set off without effective earthquake interference, inspection teams could locate and identify evidence of

an underground explosion by looking for evidence of recent activity and drilling for radioactive debris. This could be made very difficult for the inspectors by using long tunnels and preparing the shots well in advance of the explosion. In areas of deep permafrost, heat generated by underground explosion will thaw the earth markedly, reducing the electrical conductivity. This change may be detected from the nearby surface of the earth.

With a dense net of stations of high sensitivity and low interference an area of perhaps 25 square miles would require careful inspection.

18. I would suggest setting up the nuclear device in a tunnel with any desired instrumentation in a highly seismic area, and then set a strong motion seismograph to trigger the explosion when an earthquake occurred in the vicinity which was of higher magnitude than the explosion of the nuclear device. The explosion would be effectively buried in the record of the earthquake.

19. In the absence of such an inspection system, the above method would also apply. A deep underground nuclear test of 1,000 kilotons could be effectively hidden by a nearby earthquake of magnitude 7 or greater.

Reply of Roland F. Beers, Geophysicist, Troy, New York

TROY, N. Y., *April 28, 1958.*

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
United States Senate, Committee on Foreign Relations,
Washington, D. C.

MY DEAR SENATOR HUMPHREY: I wish to reply to your letter of April 9 with which you enclosed a questionnaire on seismic detection of underground explosions. I have attempted to answer the questions as fully as possible without involving classified information. As consultant to the United States Government on several occasions I have received information which could be used in preparing complete and accurate replies to the questions of the committee. Much of this information was classified at the time received. Some of it has been removed from classification since that time. As I am not informed on the status of some of this information I have been as conservative as possible in conforming to the security regulations. I am sure you appreciate the difficulty in which persons like myself are placed under these circumstances.

I hope you will find the answers I have prepared useful in the attainment of your objectives.

Sincerely yours,

ROLAND F. BEERS.

REPLIES TO QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS

1. To a considerable extent, since 1945.

2. With one possible exception, which may have been tested by an agency of the United States Government but not within my personal knowledge, the answer is "No."

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3. If the conditions prevail under which Rainier is reported to have been detected at 2,500 miles, the answer to this question would be 1 kiloton: 2,100 miles, 10 kilotons: 4,500 miles, 100 kilotons: 9,700 miles.

4. Same circumstances, same distances. The accuracy in time and location would depend upon existing arrangements in the detection system. Arrangements could be provided so that the time accuracy would be ± 0.10 seconds, or, alternatively ± 1.0 seconds. Corresponding errors in locations would be of the order of ± 1 kilometer, or, alternatively ± 10 kilometers, standard deviations.

5. The distances would be of the same order as in No. 3.

6. A minimum number of stations is three, all of which must record the event, for detection under Rainier conditions. More stations would reduce the error of epicenter location.

7. Under Rainier conditions, yes. Factors bearing on the problem include: Types of waves observed, periods, decline of wave amplitude with distance from explosion, duration of recorded waves in time, location and circumstances at epicenter, and depth of burial of explosion. Identification would be 100 percent only if theoretically optimum detection system characteristics were in operation at the time of the explosion. The probability of detection can be calculated for each size of explosion and for each distance, provided all the detection system characteristics are fully known in advance. If a definite probability is required, a system could be designed to meet it.

8. See No. 7.

9. Yes; see No. 7.

10. Probably yes, because nuclear underground explosions would probably be very much larger than detectable TNT explosions excepting at short distances (less than 1,000 kilometers).

11. The characteristics of seismograms would be affected by variations in the depth of explosion if the depth approached that of earthquakes of comparable magnitude. This is unlikely. The nature of the surrounding earth materials could affect the characteristics of the observed seismic waves but a nuclear explosion of 1 kiloton or greater would be detectable by other means (e. g., radioactivity) if it were exploded in earth materials which do not completely prevent blowout. Absorptive or shielding materials for radiation would not seriously diminish the probability of detection, with one possible exception. If a very thick layer of unconsolidated materials could provide a sufficient depth of burial to prevent blowout, it is possible that a nuclear explosion could be completely confined by this material and the resulting seismic waves would not be detectable at distances corresponding to the detection capabilities shown in the detection of Rainier.

12. The observed natural earthquakes in selected portions of U. S. S. R. and China as published by Gutenberg and Richter, Seismicity of the Earth (Princeton, 1949), show the number of shallow, intermediate, and deep earthquakes per annum to be so small as to be negligible in this problem, excepting for well-known seismic belts of limited extent in the target area. The location of a nuclear underground explosion within these belts would constitute the best camouflage available from the target area, but in my opinion it would not constitute an important reduction in the probability of successful detection under Rainier conditions. The Gutenberg-Richter formula relating magnitude to energy shows that magnitude 6 would result

from an explosion of about 44 kilotons under the stated Rainier conditions.

13. If buried at equivalent depth, detection of underwater nuclear explosions should be accomplished as easily as underground, other factors being equal.

14. I have observed seismograms from several underwater explosions.

15. It seems impossible to answer this question properly without revealing a knowledge of information which in itself is classified information. The answer is probably available from one or more agencies of the United States Government. Under appropriate security this question could be more fully answered.

16. The answer to this question depends upon the extent to which an optimum detection system is realized in practice. As for question No. 7, the probability of detection can be calculated for a given set of parameters.

17. The answer to parts (*a*) and (*b*) is yes. The maximum size of the area to be explored would depend upon the capability of the detection system. As a general statement it may be said that the area to be explored would not be unreasonable in size.

18. Considerations given for question No. 15 apply to this question.

19. It is my opinion that a detection system can be designed to detect 10KT under Rainier conditions or larger without requiring installations in U. S. S. R. or China. The exception stated in No. 11 should be noted.

ROLAND F. BEERS.

References

1. "The Underground Nuclear Detonation of September 19, 1957, Rainier, Operation Plumbbob," University of California Radiation Laboratory—UCRL 5124. Feb. 4, 1958.

2. "Seismic Waves from the Nevada Underground Explosion of September 19, 1957," Leslie F. Bailey and Carl Romney, American Geophysical Union meeting, May 5, 1958 (abstract).

Reply of Prof. Hugo Benioff, Professor of Seismology, University of California

CALIFORNIA INSTITUTE OF TECHNOLOGY,
DIVISION OF THE GEOLOGICAL SCIENCES,
SEISMOLOGICAL LABORATORY,
Pasadena, Calif., April 12, 1958.

Hon. HUBERT H. HUMPHREY,
United States Senate,
Washington, D. C.

DEAR SENATOR HUMPHREY: This is in response to your letter of April 9, 1958 with reference to seismic detection of atomic blasts.

I should be most happy to answer your questions insofar as my knowledge permits, but I am a consultant for a Federal agency associated with the subject, and answers which I would give would necessarily involve classified information. If you can advise me as to how I might proceed without violating security laws I shall be glad to comply with your request.

3. If the conditions prevail under which Rainier is reported to have been detected at 2,500 miles, the answer to this question would be 1 kiloton: 2,100 miles, 10 kilotons: 4,500 miles, 100 kilotons: 9,700 miles.

4. Same circumstances, same distances. The accuracy in time and location would depend upon existing arrangements in the detection system. Arrangements could be provided so that the time accuracy would be ± 0.10 seconds, or, alternatively ± 1.0 seconds. Corresponding errors in locations would be of the order of ± 1 kilometer, or, alternatively ± 10 kilometers, standard deviations.

5. The distances would be of the same order as in No. 3.

6. A minimum number of stations is three, all of which must record the event, for detection under Rainier conditions. More stations would reduce the error of epicenter location.

7. Under Rainier conditions, yes. Factors bearing on the problem include: Types of waves observed, periods, decline of wave amplitude with distance from explosion, duration of recorded waves in time, location and circumstances at epicenter, and depth of burial of explosion. Identification would be 100 percent only if theoretically optimum detection system characteristics were in operation at the time of the explosion. The probability of detection can be calculated for each size of explosion and for each distance, provided all the detection system characteristics are fully known in advance. If a definite probability is required, a system could be designed to meet it.

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15. It seems impossible to answer this question properly without revealing a knowledge of information which in itself is classified information. The answer is probably available from one or more agencies of the United States Government. Under appropriate security this question could be more fully answered.

16. The answer to this question depends upon the extent to which an optimum detection system is realized in practice. As for question No. 7, the probability of detection can be calculated for a given set of parameters.

17. The answer to parts (*a*) and (*b*) is yes. The maximum size of the area to be explored would depend upon the capability of the detection system. As a general statement it may be said that the area to be explored would not be unreasonable in size.

18. Considerations given for question No. 15 apply to this question.

19. It is my opinion that a detection system can be designed to detect 10KT under Rainier conditions or larger without requiring installations in U. S. S. R. or China. The exception stated in No. 11 should be noted.

ROLAND F. BEERS.

References

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2. "Seismic Waves from the Nevada Underground Explosion of September 19, 1957," Leslie F. Bailey and Carl Romney, American Geophysical Union meeting, May 5, 1958 (abstract).

Reply of Prof. Hugo Benioff, Professor of Seismology, University of California

CALIFORNIA INSTITUTE OF TECHNOLOGY,
DIVISION OF THE GEOLOGICAL SCIENCES,
SEISMOLOGICAL LABORATORY,
Pasadena, Calif., April 12, 1958.

Hon. HUBERT H. HUMPHREY,
United States Senate,
Washington, D. C.

DEAR SENATOR HUMPHREY: This is in response to your letter of April 9, 1958 with reference to seismic detection of atomic blasts.

I should be most happy to answer your questions insofar as my knowledge permits, but I am a consultant for a Federal agency associated with the subject, and answers which I would give would necessarily involve classified information. If you can advise me as to how I might proceed without violating security laws I shall be glad to comply with your request.

Although I am the designer of the most sensitive seismograph for recording of seismic waves of the type generated by blasts, excessively conservative security policies on the part of Government agencies are such that my knowledge of some aspects of existing practice is insufficient to provide definite answers to certain items of your questionnaire.

Sincerely yours,

HUGO BENIOFF, *Professor of Seismology.*

CALIFORNIA INSTITUTE OF TECHNOLOGY,
DIVISION OF THE GEOLOGICAL SCIENCES,
SEISMOLOGICAL LABORATORY,
Pasadena, Calif., April 30, 1958.

Hon. HUBERT H. HUMPHREY,
United States Senate,
Washington, D. C.

MY DEAR SENATOR HUMPHREY: I shall try to express my conclusions on nuclear explosion detection by seismic means, within the security limitations and the shortcomings of my knowledge as mentioned in my preceding letter.

If a suitable monitory network of seismic stations can be established, it is my opinion that underground explosions of the size of Rainier in Nevada and possibly substantially smaller ones can be successfully detected. The validity of this conclusion is limited by my lack of certain existing observational quantitative information.

Inspection of a world globe shows that an adequate network requires stations located in Canada, Alaska, the Aleutians, Greenland, Iceland, Spitsbergen, northern Scandinavia, Germany, Italy, Greece, Cyprus, Israel, Turkey, Pakistan, India, Hong Kong, the Philippines, Formosa, Japan, Korea, and other more distant but less important sites, as well as Iran, Iraq and Afghanistan, if these countries are sufficiently friendly. The cost of such a network would be of the order of a hundred million dollars plus upkeep.

It should be emphasized, however, that no system of detection is absolute. Any station or group of stations can be rendered ineffective by strong local winds, by local microseismic storms, by sabotage, and by instrument failures. Moreover, a nuclear test, fired just after the occurrence of a nearby earthquake would be difficult, though not necessarily impossible, to detect owing to interference on the seismogram from waves generated by the earthquake.

The Pamirs region of Turkestan is subject to rather frequent earthquakes and it is rather a remote possibility that in a test site situated there, explosions could be arranged to be triggered by an earthquake and thus be rendered less detectable.

Another possible way in which to render seismic detection difficult is to fire at a great height above the earth's atmosphere and thus greatly reduce the amplitude of the atmospheric waves which are themselves detectable and which can produce waves within the earth. This method has its obvious drawbacks.

Generally speaking, explosions can be differentiated on seismograms from earthquakes, especially if enough such records are available from a suitable network of stations. Nearly all earthquakes occur at depths substantially greater than those that can be expected from underground explosions and these differences are detectable. In

addition, the pattern of first motions observed at various stations from blasts differs from that of earthquakes.

Since no method of detection is absolute, the problem of deciding whether or not to rely on methods of detection becomes one of relative probabilities. Is disaster more likely to be encountered if we cease nuclear tests and rely on detection methods to monitor the adversary's activity than if we and they continue with active nuclear tests and development? Viewed in this manner, it is my conviction that if we agree to cease tests and rely on our detection methods, the risk of disaster is substantially less than it is if we continue as at present. Continuation will lead almost certainly to ultimate destruction of the civilization we now know. This conclusion follows from the continually increasing load of toxic fallout being generated and from the knowledge that with increasing power, perfection, and availability of nuclear military devices, there will come a time sooner or later when their all-out use will be triggered by the sudden whim of some paranoiac, come into an effective position of control in one place or another, who will not be guided by conscience, by reason, nor by the prospect of self-destruction (which can even be an incentive to such individuals).

If I can be of further help please let me know. I am leaving for Washington tomorrow and can be reached at the Hotel Statler until Friday, May 9.

Very truly yours,

HUGO BENIOFF,
Professor of Seismology.

Reply of Dean S. Carder, Chief Seismologist, Coast and Geodetic Survey

DEPARTMENT OF COMMERCE,
COAST AND GEODETIC SURVEY,
Washington, D. C., May 12, 1958.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Committee on Foreign Relations,
United States Senate, Washington, D. C.

MY DEAR SENATOR HUMPHREY: In response to your letter of April 9, 1958, I have prepared answers to your questionnaire dated April 8. On the enclosed document, the questions have been restated and the answers, to the best of my ability, follow each question or group of questions.

I trust that these answers may be of some assistance to your subcommittee.

Sincerely yours,

DEAN S. CARDER,
Chief Seismologist.

Answers by Dean S. Carder

1. I have studied seismograms from the Rainier, South Holstain Dam, and several large underground explosions. Aggregate time of study was over a 10-year period.

2. No. Possible exceptions are local ground-to-air acoustic waves.

3. If of Rainier type.

[In miles]

Shot size	Normal conditions	Quiet conditions
1 kiloton	300	600
10 kilotons	1,500	3,000
100 kilotons	3,500	[1] 6,500

[1] Also 8,500 to 12,500 miles.

4. If five or more high class stations with precision time control are located within favorable distances, distances given in (3) apply, because in (3) estimates were made on the premise of no previous knowledge of event. With five favorably located stations, location of an event may be estimated within 10 miles and time at the origin within 1 second. If 20 stations are available, locations within 5 miles in an unknown country and within 2 or 3 miles in a fairly well known country and origin time within 0.3 second are possible. An unknown country becomes known on repeated observations.

5. Records at distances in (3) would give some diagnostic information between earthquake and underground explosion. There is no absolutely certain diagnosis.

6. Five stations is the minimum for good results and they must be distributed in all quadrants about the event. This means that five stations in a small area probably can locate an event within that area if within the capabilities of the instruments. It does not mean that five widely scattered stations can locate any event in a vast area. Many more stations are needed for this (see 15).

7. Suppose that five or more stations are distributed in all quadrants about a seismic disturbance. If the disturbance is a blast, initial ground motion is generally outward in all directions and the leading wave at each station, if normal background or noise permits, is recognized as a compression. If the event is an earthquake, some of the leading waves are compressions and some are rarefractions. Thus if five stations distributed in all quadrants each show clear compressions on the leading waves, the event may be a blast. Records from blasts and shallow earthquakes are otherwise difficult to distinguish, especially in the distance range up to about 1,200 miles.

8. If event is in a seismically active area at least 7 or 8 stations would be needed to recognize as high as 80 percent of the blasts as such, because unless blasts are frequent, nearly 100 percent of recorded events would be earthquakes and nearly this percentage would be recognized as such. In a seismically inactive area, any event would be viewed with suspicion and doubtless as few as 5 stations could distinguish 90 percent of the blasts and probably 90 percent of the earthquakes as such.

9 and 10. Only if event is in a seismically inactive area but not unambiguously as a nuclear explosion unless magnitude of the event is beyond the energy range of a nonnuclear explosion.

11. Yes.

12. Of magnitude 4.25—probably hundreds a year; of magnitude 4.25 to 6—probably 200 a year; of magnitude 6 or higher—probably 50 a year. A magnitude 4.25 earthquake is usually felt several miles from the source. The Rainier explosion was not perceptible by the senses 2 miles away.

13. If Rainier is a criterion of an underground explosion, an underwater explosion is much easier to detect. If in deep water, there is no question in recognizing it as such because of peculiar afterwaves. If in shallow water, characteristics are nearly the same as an underground explosion except the underwater explosion has better coupling and shear waves are relatively smaller.

14. I studied seismograph records from the Bikini Baker and Wigwam explosions (both underwater) probably more than, or at least as much as, anyone else.

15. (*a*) Stations spaced 600 miles apart in nonseismic areas, i. e. on the Siberian shield; and 200 miles apart in seismic areas such as Kamchatka and Turkestan, and 400 miles apart elsewhere, or (*b*) a total of about 100 stations would be needed to detect a 1 kiloton underground explosion anywhere in the Iron Curtain area. (*c*) Personnel requirements are at least two men at each station together with a central staff. At least 250 men would be required, ((*d*) and (*e*) as in 8). In a seismic area nearly all natural earthquakes would be identified and probably 20 to 30 percent of explosion records would be incorrectly identified as earthquakes. In nonseismic areas probably 75 percent of earthquakes would be identified as such and 10 percent of explosion records incorrectly identified as earthquakes. (*f*) The system would require 1 year at least to implement after all specifications were in and finances assured. Simultaneously a year would be required to recruit personnel. One to two years would be required to install stations and setup and train headquarters staff and operating personnel. In all, at least 2 to 3 years would be required to place system in operation after final approval is given. (*g*) I would recommend a 3 component Benioff type short-period moving coil as used at several Coast and Geodetic Survey stations but of a higher quality and a 3 component long-period seismograph of the Press type at each station. A preliminary study of surface waves on records from the latter type seismographs to attempt diagnosis of underground versus earthquakes should be made. This has barely started. (*h*) The total cost would be 10 to 20 million dollars per year for the first 2 years and probably 8 to 10 million dollars per year thereafter. If immediate diagnosis is necessary cost would be somewhat more than this. (*i*) At this time an instantaneous HE (high explosion) and a nuclear explosion of the same KT range probably could not be distinguished except that a legitimate HE should produce surface effects that are open for inspection.

16. I can't answer this question numerically. Probably 10 to 30 percent of nuclear explosions, if of a 1-kiloton range would go unresolved. If of a higher yield, the proportion probably would be much less than this.

17. Yes to the first two parts. An HE should show outward signs if legitimate. If a clandestine explosion that did not blow out, I would suspect a nuclear explosion. If a blow out, debris would be radioactive, if nuclear. An area of 15 to 30 square miles would be required.

18. I would suggest finding a deep but dry alluvium filled valley in a seismic area and conduct tests in unconsolidated sediments, but deep enough not to blow out, and above the water table if possible. Conducting test explosions during an earthquake swarm would be an ideal time.

19. (*a*) A similar arrangement as in (18) or conducting tests in thick strata of shale or tuff and keeping yields in the 2-kiloton range or lower and choosing seismic areas in which to conduct the test should prove effective in keeping a nuclear test secret. (*b*) If seismic areas are chosen, a 10-kiloton underground explosion may remain undetected about half of the time but if several tests are conducted, at least one or two may be positively identified provided monitoring stations are located in the quiet areas of India and elsewhere along the periphery of U. S. S. R. and China. If tests are conducted in a nonseismic area, nearly all in 10-kiloton range (if underground) or over may be positively identified. Fifty kiloton to 100 kiloton, if underground may be identified by existing stations about half of the time. One thousand-kiloton shots if underground may be positively identified all of the time, unless it occurs during a strong earthquake of magnitude 7 or higher.

DEAN S. CARDER.

Reply of Prof. William L. Donn, Associate Professor of Geology, Brooklyn College

BROOKLYN COLLEGE,
DEPARTMENT OF GEOLOGY,
Brooklyn, N. Y., April 22, 1958.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: I am writing in reply to your letter of April 9, regarding the detection of nuclear-weapons tests by seismic or other means.

The questionnaire you enclosed is sufficiently hypothetical so that I can only answer some of the questions directly and will then make some general statements that may also be helpful.

1. I have studied seismograms in general over the past 12 years, but have had a somewhat limited experience with explosion seismology.

2. I am not familiar with any other useful or proved technique for detecting deep explosions.

3. An explosion of 1 kiloton should be detected up to 200 or 250 miles; 10 kilotons, about 500 to 1,000 miles; and 100 kilotons, over 2,000 miles. These figures are conservative estimates based on surface quarry blasts, which are inefficient in putting seismic energy into the ground. They are certainly minimum figures. Also, the geologic structure is quite important, for the seismic energy will lose considerably in crossing mountain ranges, etc.

4. Explosion time could be determined to a second, and possible location to one-half degree or less, depending on the number of stations.

5. ———

6. Would vary—3 to 10.

7. Explosions, especially if in a homogeneous area, should produce compressional ground movement radially from the blast. This is not so for earthquakes. Also, explosions usually produce seismic waves of very high frequency compared to earthquakes. Of course, we have

never had deep explosions of 5 to 100 kilotons so that the latter information might need revision.

8. ———

9. Uncertain, but frequency initial ground motion and place of occurrence would be helpful clues. If suspected explosions are located in a nonseismic area, chances of detection are much better.

10. No—except, if indications are that a very large explosion has occurred, it would probably be nuclear.

11. ———

12. All this information is available in Gutenberg and Richter, The Seismicity of the Earth.

13. ———

14. ———

15. ———

16. ———

17. Possible radial fracture patterns might be observed. This pattern would be much more limited in radius than that from an earthquake.

18. (*a*) Set up explosion in a highly seismic area.

(*b*) Use a region having a strong asymmetry or contrast in geologic structure.

(*c*) Use the waves from a natural earthquake to trigger the blast.

19. ———

Rather than make important decisions from hypothetical reasoning, I suggest we actually detonate underground nuclear explosions of varying sizes so that seismologists can calibrate against known conditions. This ought to be as worthwhile as current air tests and would also have tremendously valuable scientific byproducts.

I can further note that in the event of "clean" bombs, obviating detection by fallout, air blasts could probably be detected and located quite well by microbarographic oscillations set up. Using relatively insensitive instruments, the Japanese have done reasonable work. I have been working for some time with ultrasensitive microbarographics which would be very useful in this work. These instruments can detect very strongly the pressure change produced by a door being opened or closed in a building.

I hope these rather inadequate answers will be of some help to your committee.

Sincerely yours,

WILLIAM L. DONN,
Associate Professor of Geology.

Reply of Dr. Jack F. Evernden, Department of Geology, University of California

UNIVERSITY OF CALIFORNIA,
DEPARTMENT OF GEOLOGY,
Berkeley, Calif.

HUBERT H. HUMPHREY,
United States Senate, Washington, D. C.

DEAR SIR: I guess that I should apologize for not answering your previous letter, but I felt that you desired only competent opinions, not a statistically complete reply. I have discussed these matters

with Drs. Carl Romney and Don Tocher, and I felt that they would have said all that I could contribute.

As I see it, any explosion must be recorded at several stations in varying azimuths in order to insure its identification as of explosive origin. As you, no doubt, know, the record of the Rainier shot at Berkeley was virtually indistinguishable from that of an earthquake, the development of transverse or shear waves being well beyond all expectations. I feel certain careful study of the records from the Rainier shot or from similar shots will establish criteria for identifying them, unequivocally, as of explosive origin. It will not be as simple as had been expected, however. As I know nothing of the nature of the explosive source used on the Rainier shot, I must presume that it introduced no asymmetry into the radiation pattern, but that this asymmetry (with the associated development of shear waves) was introduced by the physical and geologic conditions of the explosion site. I suspect that, if a nuclear explosion took place in a hole in the middle of an alluviated valley, there would be little development of shear waves, and the identification of the seismic event as due to an explosion would be very simple.

I would say that the maximum distance for effective observation of a 1-kiloton explosion would be 400 kilometers, and that it would be highly desirable to have stations within 250 kilometers of the epicenter. Effective observation of a 100-kiloton shot should be possible at 4,500 kilometers, with 2,500 kilometers being desirable.

On detailed costs of a detection system, I can contribute nothing, but I would say that the indicated costs for detecting 1-kiloton shots would be prohibitive.

I am quite certain that the detection of underwater explosions would be very easy. I have seen the record obtained at Berkeley of the Navy nuclear explosion off the coast of California. This record had nothing in common with an earthquake record and was, quite obviously, of explosive origin.

If a shot is buried sufficiently deep, there will be no surface evidence of an explosion. The only evidence would be that due to activity in the area associated with preparation for the shot or for observing its effects. However, during a moratorium on such shots, observation of its effects would be impossible, as this would certainly be detected by a police force. Being naive in these matters, I fail to see the utility of shots whose effects cannot be observed and investigated. The act of causing a seismic event will immediately focus attention on the epicentral area, and further activity will be impossible.

If I wished to explode a shot and to avoid detection, I would—

(*a*) shoot in a seismically active area and shoot during an aftershock sequence. This might seem too difficult to arrange, but the great numbers of Kurile and Kamchatka shocks make it not impossible;

(*b*) exploit the weaknesses of the detection system. The point would be to deprive the policing force of the possibility of effective analysis of the seismic event;

(*c*) make the seismic records look as much like earthquake records as possible. This would require an analysis of the real causes of shear energy in such shots as Rainier;

(*d*) minimize the development of radiated elastic energy. The site of the explosion would have a large effect on this; I do not know whether measures taken for shielding or absorption would be effective;

(*e*) attempt to confuse the police force by such things as shooting simultaneous shots so placed as to garble the records.

I hope that this letter is satisfactory and that it is of some use to you.

Yours truly,

JACK F. EVERNDEN.

Reply of Maurice Ewing, Director, Lamont Geological Observatory

COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK,
DEPARTMENT OF GEOLOGY,
LAMONT GEOLOGICAL OBSERVATORY,
Palisades, N. Y., April 18, 1958.

SENATOR HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: The enclosed reply to your questionnaire is apparently incomplete, but, for the majority of the questions, I have conferred with my colleague, Dr. Jack Oliver, and the replies which he has made represent our combined judgment.

Sincerely yours,

MAURICE EWING.

REPLY OF MAURICE EWING, LAMONT GEOLOGICAL OBSERVATORY, APRIL 18, 1958, TO QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS

1. I have studied small underground explosions in connection with seismic prospecting since 1926, larger ones from quarry blasting, etc., since 1930, and I have made examinations of the recent seismograms from larger explosions.

2. No.

3 through 13. See the reply of Dr. Jack Oliver.

14. I have studied seismograms from underwater explosions for seismic prospecting since 1927, in connection with submarine mines for the Navy in World War II, in connection with acoustical transmission through the ocean since 1944, and I have examined seismograms from the large underwater explosions of the last few years in the Pacific.

15 through 19. See the reply of Dr. Jack Oliver

Reply of Prof. Beno Gutenberg, Professor of Geophysics, California Institute of Technology

CALIFORNIA INSTITUTE OF TECHNOLOGY,
DIVISION OF THE GEOLOGICAL SCIENCES,
SEISMOLOGICAL LABORATORY,
Pasadena, Calif., April 23, 1958.

Hon. HUBERT H. HUMPHREY,
Committee on Foreign Relations,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: Enclosed I am sending you my replies to your questionnaire on seismic detection of underground explosions.

A few of the questions I did not answer either on account of the fact that I do not have sufficient information or since I would have to use information which I received while I was consultant to a Government organization working on problems related to those in the questionnaire. Most of this information which I received there is highly classified and it would require special permission to use it. Otherwise, I do not see any reason why my answers should be kept confidential.

Sincerely,

B. GUTENBERG,
Professor of Geophysics.

REPLIES TO QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS

1. I have studied seismograms from underground explosions (quarry blasts) for many years. Reprints of published papers are enclosed.

2. No.

3. The distance at which an underground explosion can be detected depends very much on the material in which the explosion occurs. In dry, porous material underground, much more energy is absorbed than in solid rock or in water, including ground water. Moreover, the distance depends very much on meteorological conditions. On days with small microseisms the record of an explosion can be detected and used at distances appreciably greater than on days when the microseisms (mostly connected with high ocean waves or instable air) are large.

4. See the answers to No. 3. If the data are good, the time of the explosion can be found within a few seconds, the location within 5 or 10 miles if stations record the explosion in various directions from the source and at distances within 50 miles. The accuracy of time determination will still be within about 5 seconds if there are a sufficient number of stations at distances beyond 1,000 miles in various directions from the source. The location of the source can then be found within a radius of about 20 miles for one of the larger atomic explosions. Both the time accuracy and the location accuracy decrease as the number of observing stations decreases and especially if there are larger sectors, especially over 100°, in which there are no stations; that is if most stations are more or less in the same direction from the source.

5. ———

6. For accurate location at least about 10 stations are needed in various directions covering at least a half circle. See also answer to No. 4.

7. This depends on the size of the explosion. I do not have sufficient information to estimate the percentages.

8. The more stations the better. Natural earthquakes could be located under the condition given in No. 6 if their magnitude is large enough.

9. I am very doubtful about the circumstances under which one can determine unambiguously that an underground explosion has occurred. This decision cannot be made for small explosions. Small earthquakes may give a record which consists only of the first longitudinal wave without surface waves which are characteristic of large earthquakes. These have much more energy than the present explosions. Small earthquakes may occur anywhere although they are more likely to occur in earthquake belts; however, we still get earthquakes of magnitude 6 or even more almost every year from regions in which, since the beginning of useful records about 50 years ago, no earthquake has been found from records at stations all over the world. It is usually difficult to find the depth of focus for small earthquakes and to decide beyond doubt if the source was within a mile of the surface. Earthquake foci are usually deeper.

10. ———

11. Yes. See answer to No. 3 for the second part of the question.

12. There are roughly 200 shocks in the Pacific belt of the U. S. S. R. per year and perhaps 100 in the interior of the U. S. S. R. and China with magnitudes of 4¼ to 6. There are roughly 20 earthquakes annually in the Pacific belt of the U. S. S. R. and perhaps 5 inland and in China of magnitude 6 or more. However, one has to consider the fact these are average annual numbers. There are great changes from year to year and in some years all these numbers may be appreciably higher a few times than those given above, while in others the number may be extremely small.

The question, "What size explosion would produce a magnitude of 6?" cannot be answered correctly. The magnitude scale is designed for earthquakes in which longitudinal, transverse, and surface waves are excited. In explosions most of the energy goes into longitudinal waves, so that the magnitude scale does not apply even approximately to artificial explosions. If a magnitude is given for an artificial explosion it means only that it has longitudinal waves of about the same size as an earthquake of the same magnitude.

13. It is much easier if the explosion is under water.

14. See enclosed reprint.

15. The more the better; especially in earthquake regions the stations should not be much over 100 miles apart. With short period highly sensitive electromagnetic type vertical and horizontal instruments all shocks down to magnitude 3 or even less could be located. The blasts usually show relative to the longitudinal waves much smaller transverse waves as indicated above, but decision, if it is an earthquake or a blast, would not be absolutely certain. I do not know details of nuclear test records. For small explosions, confusion with small earthquakes is certainly possible. I have no data from which I could answer the question whether a system would be capable of identifying an underground explosion as a nuclear explosion.

16. ———
17. ———

18. It would be best to use an earthquake region with very porous dry layers. During a period of microseismic storms (usually especially strong during the winter) it is more difficult to find traces of explosions or earthquakes than during quiet times (usually during the summer).

19. I do not quite understand the meaning of the second sentence, "In the absence of seismic stations in the U. S. S. R. and China." There are almost 100 stations there—many of them first class, and their cooperation certainly would be required. If they would not cooperate, or would not furnish their records, or if many would have defective records this would certainly be a reason for suspicion that they would try to conceal something. To my best knowledge, I do not believe that it is possible to prove the fact of a small nuclear explosion beyond reasonable doubt.

BENO GUTENBERG,
Professor of Geophysics, California Institute of Technology.

Reply of Dr. Norman A. Haskell, Chief, Wave Propagation Branch, Terrestrial Sciences Laboratory, Geophysics Research Directorate, Air Force Cambridge Research Center

HEADQUARTERS, AIR FORCE CAMBRIDGE RESEARCH CENTER, AIR RESEARCH AND DEVELOPMENT COMMAND, UNITED STATES AIR FORCE,
Boston, Mass., June 2, 1958.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Senate Committee on Foreign Relations,
Washington, D. C.

DEAR MR. CHAIRMAN: I am sending a reply to your questionnaire of April 8, 1958, on the seismic detection of underground explosions. In all replies it is assumed that an underground explosion means one that takes place at a depth sufficient to prevent the formation of a visible crater or dome at the surface and the release of any radioactive products into the atmosphere.

Only unclassified sources of information have been used in preparing these comments.

Sincerely yours,

NORMAN A. HASKELL,
Chief, Wave Propagation Branch, Terrestrial Sciences Laboratory, Geophysics Research Directorate.

REPLY TO QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS BY N. A. HASKELL

1. Only to a limited extent, mostly examples of small, high-explosive shots published in open literature.

2. No.

3. Detection ranges may vary widely, depending upon geological environment at shot point and along the path of propagation and the

seismic noise level at the detection site. I would estimate that 90 percent of all cases would fall between the following limits.

	Miles
1 kiloton	850–1, 700
10 kilotons	1, 700–3, 400
100 kilotons	3, 200–6, 500

4. Possibly about two-thirds of the above ranges, say:

	Miles
1 kiloton	550–1, 100
10 kilotons	1, 100–2, 200
100 kilotons	2, 100–4, 300

Origin time should be determinable to within about 1 second. If the actual ranges of detection were between 550 and 1,100 miles, it is believed that the point of origin could be located to within a radius of 5 miles. For the 1,100- to 2,200-mile interval, the corresponding positional accuracy might be 7 miles, and for the 2,100- to 4,300-mile interval it might be 9 miles.

5. Same as in 4.

6. Three.

7. The transverse (shear) waves resulting from a blast should have smaller amplitudes relative to the longitudinal (compression-rarefaction) waves as compared to the amplitudes of the corresponding waves in earthquake records. There may also be differences in the characteristics of the surface waves that could aid in the identification. It is believed that a reliability of 90 percent or better could be achieved if an extensive background of statistical data were available.

8. Do not believe more stations would be required for identification than for location.

9. A completely unambiguous determination can probably not be made from seismic evidence alone.

10. There should be no seismically detectable difference between a nuclear explosion and a chemical explosion of the same magnitude.

11. The factors mentioned would, almost certainly, have some effect, but probably not enough to make diagnosis impossible. To produce any significant degree of shielding by artificial means would be an enormous problem and is probably entirely impracticable.

12. From data given by Gutenberg and Richter in Seismicity of the Earth, it appears that about 4.3 earthquakes per year of magnitude 6 or greater can be expected within the combined area of the U. S. S. R. and China. Direct data on smaller magnitudes is lacking, but, if the world average of increase in numbers with decreasing magnitude is extrapolated down to a magnitude of 4.25, it appears that about 140 earthquakes of magnitude between 4.25 and 6 should occur per year in this region.

If Rainier is taken as the standard, an underground explosion of 1,000 kilotons should be equivalent to a magnitude of 6. However, Rainier was fired in a rather soft and porous volcanic rock in which the efficiency of the conversion of explosive energy into elastic wave energy may have been less than it would be in a more compact medium. If, under some circumstances, the conversion factor might be as much as 10 times as great as it was for Rainier, 100 kilotons might result in a magnitude of 6.

13. The ocean forms a highly efficient low-loss channel for the propagation of compressional waves. Even the smallest underwater

nuclear explosion should be detectable by suitable underwater microphones placed at any points where the propagation path was not obstructed by a large land mass.

14. None.

15. If the pessimistic estimate of a 550-mile identification radius is accepted, and it is required that all points within the U. S. S. R. (including adjacent Arctic islands) and China be within 550 miles of at least 3 seismic stations, it would require about 73 stations, distributed at 550-mile intervals, to give complete coverage of the area. If the optimistic estimate of 1,100-mile identification radius is accepted, the number of stations required would be reduced to about 26.

I do not feel competent to estimate the personnel requirements of such a system without an extensive study of the possibilities of unmanned operation of many of the more remote and inaccessible stations, employing radio data transmission to a smaller number of master stations where data recording and preliminary processing would take place. The same remark applies to cost.

With the 1,100-mile station spacing suggested above as optimistic, I would suppose that 90 percent or more of all earthquakes of magnitude 4.3 or greater occurring in these regions would be correctly identified. With the 550-mile station spacing, earthquakes down to a magnitude of about 3.7 could be identified with a similar reliability. With regard to the probability of an explosion being identified as an earthquake, see 7, above.

I would suggest that each station be equipped with 3-component, short-period Benioff seismometers for body-wave identification and, also, 3-component, long-period seismometers of the Columbia University type for surface-wave identification.

The system would not distinguish between nuclear and chemical explosions.

16. Have no basis for estimation.

17. For yields up to 100 kilotons and, perhaps, up to 1,000 kilotons, it would appear to be entirely feasible to bring the shot deep enough to prevent any surface evidence of the explosion other than that left by the process of driving the access shaft or tunnel to the explosion chamber. The inspection teams would, therefore, have to search the suspected area for signs of mining or drilling activity and then drill to intercept the explosion cavity. Detection of high radioactivity in the borehole would then establish the fact of a nuclear explosion. As indicated in 4, it is believed that a seismic network of the density suggested could locate the site of the explosion to within a radius of about 5 miles. An area of about 80 square miles would, therefore, have to be searched.

18. With the relatively short ranges probably required to detect and identify explosions down to the 1-kiloton level, most of the stations of the detection network would be on U. S. S. R. and Chinese territory and would, therefore, be vulnerable to jamming. For example, parties operating, ostensibly, as seismic exploration crews could be located near each of the stations of the network that might possibly be in positions to detect a given shot. Just before the earliest possible time of arrival of the seismic waves at each station, these crews could commence firing a number of high-explosive shots, creating a high local noise level to mark the signals from the clandestine nuclear shot. The existence of coordinated jamming of this kind

would, of course, create a presumption that a nuclear shot was being hidden, but there would be no data from which to determine an accurate location and obtain conclusive proof of the fact.

19. If only stations outside U. S. R. R.- and Chinese-controlled territory were to be used, it is believed that seismic detection and location of underground explosions down to 100 kilotons could be made almost certain. Shots as small as 10 kilotons would be detected some of the time but, probably, not under all circumstances. Seismic detection of a large-yield explosion would suggest that the shot was nuclear, but actual proof would require on-site detection of high concentrations of radioactive debris.

Reply of Dr. Ross R. Heinrich, Institute of Technology, Department of Geophysics and Geophysical Engineering, St. Louis University

ST. LOUIS UNIVERSITY,
INSTITUTE OF TECHNOLOGY,
DEPARTMENT OF GEOPHYSICS AND
GEOPHYSICAL ENGINEERING,
St. Louis, Mo., May 14, 1958.

SENATOR HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Committee on Foreign Relations,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: In reply to your letter of May 2, 1958, asking for my additional comment on the questions supplied by your letter of April 9, 1958. I shall give my reply by question number in the text below.

1. While during the past 20 years I have made many studies of numerous seismograms of the seismic waves recorded from underground blasts of dynamite and similar explosives, I have made no definitive studies of seismograms of underground nuclear blasts. I have examined the recordings made at our own station during the Rainier blast in Nevada and this has been almost the extent of my examinations. I have made no special studies of this matter.

2. At the present time, no.

3. The distance from the explosion site at which an underground blast may be detected is a variable and depends on—

(*a*) Whether an interpretive or noninterpretive detection is desired.

(*b*) The site factors of the detonation (i) size of charge (ii) emplacement (iii) rock character, structure, and stratification (iv) type of detonation, etc.

(*c*) Factors influencing the propagation of the seismic waves along paths in various directions surrounding the blast site. Through or along mountain ranges, etc.

(*d*) Factors determined by the location of the recording station rock, subfoundation, terrain, background noise, level of microseisms, etc.

(*e*) The type of instrumentation used for the recording.

(*f*) The experience of the analyst with this type of recording and the peculiarities of the individual station.

(*g*) Others.

31345 O—58——35

Consideration of the above factors indicates the difficulty of giving a single value limit to the maximum distance at which detection of an unknown explosion would be detected from seismograph data alone.

From the data available to me, from ordinary news channels, it appears that only an examination of the individual records of stations at various distances and directions from the Ranier test (1.7 kilotons) would reveal these limits.

Interpretive records were obtained at distances of several hundred miles, while noninterpretive records were obtained at greater distances.

My own experience, with records of the Bristol, Tenn., blast of July 14, 1948 (TVA 840,000 pounds nitromon), suggests a value of 450 miles as the order of magnitude of distance for interpretive detection. Around this value there will be a range which will vary with the factors listed above. I have no basis for comparison of blasts of higher yield. While it might normally be expected that the distance would increase with the increase of charge, this may also serve in a decreasing manner by increasing the possibility of confusion with earthquakes for certain distance ranges.

I would need to conduct an analysis of items (*a*) to (*g*), above, to derive specific values and ranges.

4. The distances at which seismic waves would be recorded, so that an epicenter might be determined from the records of several stations, would be expected to be greater than the distances for interpretation of records from a single station.

The latter requires essentially an integral seismogram showing the many phases and characteristics of the disturbance.

The former might only require a single phase or event on several station records.

5. My answer to this question is similar and related to the answer to question 3. My experience with seismograms of nuclear explosions in the near distance range is too limited to set a value.

My experience with TVA dynamite blasts recorded at St. Louis gives me the order of magnitude of 450 miles. I hesitate to transfer this experience to nuclear blasts, because I do not know that the two phenomena are directly transferable.

6. Assuming all stations of equal ground and instrument sensitivity and time-recording accuracy, and assuming all stations are functioning properly, within the zone of waves, a minimum of four should be required. More are desirable for check purposes.

7. Interpretive detection requires experience in actual recording. My experience has been with seismograph records of dynamite (or similar) blasts compared to records of the seismic waves from earthquakes. St. Louis records of dynamite blasts compared with earthquakes show differences. The duration of individual phase bursts are smaller, fewer individual phases and bursts appear, and the overall duration of the disturbance is less for dynamite blasts than earthquakes.

8. The data of the analysis outlined in question 3 are required before I can give a definitive answer.

9–10. I have been able to identify certain dynamite blasts on seismograms on the basis of prior experience. There are, however, many events recorded on seismograms which lack identification.

Perhaps with some experience (research) those circumstances, under which identification of nuclear explosions is possible, could be defined. I do not have this experience at the present time.

11. Yes; see answer 3.

12. I do not have these data immediately available, but some evaluation could be made from various earthquake studies in the literature.

13. I have little experience with seismograph recordings of underwater nuclear explosions at close distances. The presence of characteristics promoted by the water layer (such as excitation of T phase) might assist recognition.

14. I have examined some of the seismic wave recordings made at our station in St. Louis for some of the explosions which were recently acknowledged, located, dated, and timed in a communication from the National Academy of Sciences. My examination, however, has been quite brief.

15. To obtain this answer would require a study of the points listed in answer 3 above.

Only these data would permit an operational and cost evaluation of such an interpretative detection network.

I do not have sufficient data for a resonable evaluation.

16. I cannot give an estimate for lack of data.

17. I have no experience in observing ground regions after nuclear explosions.

18. After obtaining knowledge of the diagnostic characteristics of nuclear blast seismograms I would seek methods of confusing or distorting such seismograms, detonation at times of proper seismic background. Perhaps seismic noise might be generated in a confusing pattern.

19. I do not have information on limiting distances for various yield nuclear blasts.

Sincerely yours,

ROSS R. HEINRICH.

Reply of Dr. William B. Heroy, Jr., Vice President, The Geotechnical Corp.

THE GEOTECHNICAL CORP.,
Dallas, Tex., April 30, 1958.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Committee on Foreign Relations,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: This letter is in reply to your letter of April 9, 1958, requesting assistance in the field of seismology by means of a questionnaire. The comprehensive nature of many of your questions must certainly be evident to you. The greater part of your questions involve answers that require qualification. In some cases, the degree of qualification is so high that the type of answer called for cannot be regarded as having significance.

I am sure that you have people to describe to you the practical problems in detecting, recording, and interpreting seismic waves. There is a wide variation in seismograph station capability. Some of the factors which determine the effectiveness of a seismograph station are: (1) Geological setting; (2) proximity to cultural, industrial, or natural noise sources such as highways, railroads, machinery, water-

falls, or large bodies of water; (3) weather (and season); (4) location relative to earthquake foci; and (5) type of equipment used in the seismograph system.

In practice, we have no standards for grading or classifying seismograph stations. In other words, there are no parameters by which the capabilities of the many stations throughout the world are rated as to their relative capabilities. However, in certain cases great pains have been taken to measure true ground motion and some stations check the gain of their system with the same routine care that they do the time accuracy of their system.

My earthquake seismograph experience has been exclusively with instruments of short-period, variable-reluctance types similar to those designed by Dr. Hugo Benioff. I have no direct knowledge concerning the application of long-period instruments to the problems you present.

Please call on me for further assistance if desirable or necessary. I am grateful for the opportunity to be of service in your important work.

Respectfully yours,

Dr. WILLIAM B. HEROY, Jr.,
Vice President, The Geotechnical Corp.

REPLY TO QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS SUBMITTED BY DR. WILLIAM B. HEROY, JR., THE GEOTECHNICAL CORP., DALLAS, TEX.

1. I have 12 years' experience in seismic exploration and applied seismology. I have studied seismograms from several underground explosions including Ranier, and several recent Utah blasts.

2. None, other than espionage.

3.

Yield:	*Detectable distance (degrees of arc)*
1 kiloton	6° (possibly up to 25° depending on variations in the travel-time curve).
10 kilotons	90° (exceptionally quiet place).
100 kilotons	180°.

"Detected" is here interpreted as meaning "recorded and identified as an event by seismic methods."

4. The accuracy of an epicentral determination depends on: (1) The clarity of the signal; (2) the accuracy of time readings at the several stations; (3) the number of stations recording the event; and (4) the geographic location of the stations recording the events in relation to the epicenter.

If there are enough properly located stations, an epicenter can be located within a radius of 10 miles. The time of the event would be determined within 2 seconds.

5. From short-period recordings and for small energy (1 kiloton–10 kilotons) underground explosions, no positive criteria for distinguishing blasts from earthquakes are now available.

If enough data are obtained from enough stations, a distinction can be made by determination of the first motion of the energy release. This is a factor more of density and clarity of data than of distance from energy source. Distance, in itself, is not the controlling factor.

6. Four. These should be at different bearings and/or distances from the epicenter, and show accurately the times of the P and S phases.

7. No.

8. Twenty properly equipped stations. This number applies if the stations are all located within 20° of the epicenter and are well distributed around it. The problem is to distinguish blasts from natural earthquakes. With this coverage, you have a 90 percent chance of distinguishing blasts and earthquakes correctly, assuming that the event in question is of sufficient size to produce good records at all stations.

9. No.

10. No.

11. The characteristics of a seismogram utilized for distinguishing between surface explosions and earthquakes do not necessarily apply to underground explosions. We do not have enough data from underground explosions at various depths or under differing geological conditions. In my opinion, it is highly doubtful if an identifiable variation in wave character could be accomplished by deeper burial or by shielding.

12. Between 1,000 and 2,000 earthquakes of magnitude 4.25 to magnitude 6 occur annually in the U. S. S. R. and China.

Between 10 and 20 earthquakes of magnitudes larger than 6 occur annually in the U. S. S. R. and China.

Assuming that the third question applies only to underground explosions, I do not have enough information to answer the last part of the question.

13. This is an ambiguous question. If an underwater nuclear explosion is meant, it may be easier to detect such an explosion than an underground explosion. If the question refers to the location of the detector, underwater or underground, I have no information.

14. To a very limited extent.

15. In order to insure a maximum probability of detecting violations by seismic means, seismograph stations should be established every 8 to 10 degrees of arc (500–700 miles). For the Soviet Union and China, and other land areas where clandestine tests could take place, 40 to 50 stations would be required. For the rest of the land area of the world, part of which is already covered, another 50 to 60 stations would be needed. Even so, large oceanic areas in which tests could be made clandestinely would not be adequately covered. This means a total of 100 or more stations would be needed for world coverage. It is anticipated that many existing stations would contribute data to support this new network.

The personnel requirements for each station would be a minimum of five technical people with their capability divided between seismology and equipment operation and/or maintenance. In addition, a comprehensive study of all seismograms should be made in a laboratory for seismological review. It is possible that such a laboratory would require as many as 250 people, many of whom would need to have a high degree of capability.

It is expected that 95 percent of the earthquakes normally occurring in the Soviet Union and China could be correctly identified by such a system. The rest of the world would probably not all be covered.

I estimate a 10 percent probability that an explosion would be incorrectly identified as an earthquake. This is not a meaningful figure in the light of our present state of knowledge.

On a crash basis, a worldwide system of stations could be set up and running in 2 years' time. This would be a major undertaking.

The basic equipment in a surveillance system should be short-period instruments with extremely high gain and precise timing. The best combination of instruments would be a variable-reluctance, three-component system using phototube amplifiers and film recorders. Supplementary equipment could include long-period instruments, in the 30-second range.

It could be expected that the cost of setting up 100 well-equipped seismograph stations, half within the Soviet Union and China, would be $25 million to $50 million. I think that it would take a similar amount to operate such a system each year.

In my opinion, such a system would not be capable of identifying an underground explosion as a nuclear explosion.

16. This depends upon the seismicity of the areas under surveillance. It might be anticipated that between 100 and 200 cases per year would be unresolved.

17. This is not basically a seismic problem. Is there any surface evidence from Rainier? If the inspection team were equipped and permitted to drill holes, which seems unlikely, they could probably find positive evidence of an underground explosion and probably identify it as an underground nuclear explosion. Depending on the size and depth of the charge, there might be surface evidence of mining or hole-drilling operations, but these could probably be concealed beyond detection.

With present seismic traveltime curves, it is possible to make an epicenter location within a radius of 10 miles. This means that an on-the-spot team would have to cover an area of over 300 square miles for each suspected event. However, with a system of new stations, the traveltime curves could probably be refined to reduce this figure somewhat.

Considering only seismology, I would suggest that geophysical work be done on the Rainier site to obtain information to answer the last question of this group. The shatter zone might be defined by reflection seismograph surveying.

18. (1) Location to be in heavily wooded, highly seismic area;

(2) Location to be in area of normal mining operations so as to attract minimum amount of attention;

(3) An abandoned mine working might be a suitable location;

(4) Hole to be drilled instead of tunnelled; equipment and supplies to be transported by helicopter rather than by roads built to the site;

(5) Any waste material from the excavation to be removed and dropped in nearby body of water or stored underground;

(6) Hole to be sealed with cement, using the cuttings in the mixture.

19. In the absence of nearby seismic stations, an explosion could be easily concealed by placing it in a highly seismic area such as Hindu Kush, the Himalayan arc, or Kamchatka.

I believe that deep underground nuclear tests of yields in the range of 10 kilotons up to 50 kilotons (assuming they could be contained) could be conducted in such a manner as to prevent our obtaining positive proof of their occurrence, in the absence of a seismic inspection system.

It is difficult for me to understand how explosions of yields greater than 50 kilotons could be contained underground. If this were possible, the epicenters would certainly be located seismically. Whether they would produce diagnostic seismograms I do not know, but I think that long-period seismometers might play an important part in determining such cases. However, I have no experience in this respect.

Reply of Dr. B. F. Howell, Jr., Head, Department of Geophysics and Geochemistry, the Pennsylvania State University

THE PENNSYLVANIA STATE UNIVERSITY,
COLLEGE OF MINERAL INDUSTRIES,
DEPARTMENT OF GEOPHYSICS AND GEOCHEMISTRY,
University Park, Pa., April 17, 1958.

Mr. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmanent,
Committee on Foreign Relations,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: In response to your letter of the 9th, below are my answers to the questions you raised:

1. My principal area of research is the study of seismograms from small explosions.

3. The answer to this is a guess. Dean S. Carder of the United States Coast and Geodetic Survey can probably answer this question accurately. One kiloton could be detected at distances of a few tens to hundreds of miles; 10 kilotons perhaps at distances of 1,000 to 2,000 miles; 100 kilotons would be detectable perhaps as far as several thousand miles or more. The fact that they would be detected does not necessarily mean that they would be recognized as an explosion phenomenon rather than a natural earthquake.

4. It takes arrivals at 2 stations to locate the epicenter (actually 3 stations are required, but 2 stations give a choice of 2 possible epicenters, 1 of which can usually be easily eliminated). The distances at which accurate epicenter determinations would be possible are substantially less than those given in question 3. The accuracy depends on the quality of the record, and decreases somewhat near the fringe of observability. It is possible that instrumentation could be designed for the detection of explosions of this kind which would be much better than the standard instruments which we now use. This is particularly true if such instruments were put in abandoned mines or in the bottoms of boreholes. Such a program would be expensive in terms of the budgets which most seismic observatories now have, but are not by any means high compared to most types of research. I believe that a $100,000 spent on this problem would result in a very substantial increase in our ability to detect phenomena of this sort. Indeed it is very possible that such research has already been done by those concerned with our atomic tests. Dr. H. E. Tatel at the Carnegie Institution of Washington has made some tests of this sort.

5. I do not know the answer to this. I believe this could be determined by research on our own explosions. I suspect that there are people who have done this research, but I do not know who they are, as the work has been classified.

6. Three is generally required, but a good guess can be made with two. See question 4 above.

7. It is very difficult to distinguish a blast from an earthquake. I believe, however, that a blast will generally give a greater percentage of surface waves compared to body waves and that the sharpness of the pulses can be expected to be greater. The degree to which this is true has yet to be determined by experiments. It would be difficult to distinguish between the two in all cases unless very good records were obtained. Even then it might not always be possible. However, if epicenters were accurately determined, and someone could go to the region of the epicenter to look for the effects of the earthquake, then one might be able to distinguish atomic blasts from natural earthquakes.

8. Identification of the record as being from a blast does not depend on the number of stations but on the quality of the record at one station.

9. With present knowledge I could not determine for sure that a record was from a blast. However, I believe that a little research would make it possible to determine in the case of good records whether the seismogram was that of a blast or natural earthquake.

10. I do not believe that one can determine an underground nuclear explosion from any other kind of blast except by its size. A small nuclear explosion would be indistinguishable from a large quarry blast.

11. Yes.

12. Offhand, I do not know the answer to this. Professor Beno Gutenberg at the California Institute of Technology, in Pasadena, is the leading world authority on magnitude. Earthquakes with magnitude 4.25 to 6 are quite common throughout much of Asia including both Siberia and China. I know of no disturbances other than earthquakes and nuclear explosions which would produce a disturbance of magnitude 6.

13. Only to the degree that it is easier to record waves in the ocean. The oceans are a single medium of uniform composition whereas the ground is a much more complex medium.

14. I am not an expert on underwater explosions. I have not worked in this area for 10 years, at which time I was not concerned with the nature of the explosions so much as their practical use in geophysical exploration.

15. It would be impossible to detect very small nuclear explosions. This would require a network of seismometers every 100 miles on a square grid network. I do not believe it would be practical to try and locate any test except large nuclear tests. These would require a network of perhaps every 500 to 1,000 miles. There are probably a million natural earthquakes in the world per year. I do not believe it would be practical to watch nuclear explosions of magnitudes smaller than 3 to 4, as the number of disturbances is so very large. There are probably on the order of magnitude 10,000 earthquakes annually of magnitude 4 or greater. This will give some idea of the difficulty of watching for nuclear explosions with earthquake sensitive apparatus.

16. I do not believe any inspection system would work unless someone can go to the region where the earthquake is believed to have occurred and look for the effects. Even then it might be very hard to detect an underground explosion.

17. It would be very difficult to locate an underground source if a careful attempt had been made to conceal it. Such a source would have no evidence at the surface. Our own tests in Nevada proved this.

18. I would use an abandoned mine or a new shaft coming out in an old quarry or in a building near a river where the debris from the excavation could be dumped in the water without leaving a visible trace.

19. Without an inspection system, underground tests would be very simple to hide. The shaft dug for detonating the test would be no different from other mining operations and the debris of excavation could be easily concealed or camaflouged to look like an ordinary engineering operation. Without seismic stations in the U. S. S. R. and China small and moderate sized nuclear explosions would be undetectable. I suspect that this is certainly true for 10 kiloton explosions, possibly true for 50 and 100 kiloton explosions, but I think that it might always be possible to detect a 1,000 kiloton detonation.

I know of no foolproof way of monitoring nuclear explosions which would assure with complete confidence that any one nation could keep track of what another nation was doing. It is to be expected that as knowledge of nuclear science increases it will become possible to use nuclear energy in a wide range of explosive and other uses for both peaceful and military applications. The variety of industrial processes involved will be so great that they cannot be efficiently monitored.

Sincerely yours,

B. F. HOWELL, JR.,
Head, Department of Geophysics and Geochemistry.

Reply of Dr. Leon Knopoff, Associate Professor of Geophysics, University of California

UNIVERSITY OF CALIFORNIA,
INSTITUTE OF GEOPHYSICS,
Los Angeles, Calif., April 30, 1958.

Senator HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Committee on Foreign Relations,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: I enclose herewith my response to the questionnaire on the seismic detection of underground explosions. I have attempted to be brief. However, this is not possible in some of the piercing questions which have been put in the questionnaire. The solution to the problem which I suggest is unfortunately extravagant in the matter of personnel, initial cost, and in the requirement that the monitoring be made on a local scale, namely within the countries to be monitored. My response to the questionnaire follows:

Questions 1 and 14: I personally have not studied any of the seismic records from underground explosions, nor any seismic records from underwater explosions. I hope this seeming lack of enterprise on my part will not be considered as lowering the authority with which this questionnaire may be answered; this lack of observational background will not prevent me from responding. In explanation of the

above, it should be pointed out that I am a student of the theory of seismology rather than a student of observational seismology; my responses will be made in the light of seismic theory and will refer to several theoretical problems we have solved.

Question 2: For completeness, we note that the energy of an underground nuclear explosion should be converted into seismic energy, into energy of deformation of matter in the vicinity of the source, and into heat. Surface detection of the last two features of an explosion are not practical. Any deformation of the surface can be made negligible by shooting sufficiently deeply. In the case of the liberated heat, the surficial heat flow would change but at times of the order of months or years after the shot and measurably so only at sites immediately adjacent to the epicenter. For small shots this effect may be negligible even at the epicenter. I can suggest no techniques other than seismic techniques for the rapid detection of underground explosions at unknown sites and times.

Questions 3, 4, and 6: Using the standard definition 1 kiloton $=4\times10^{19}$ ergs, and the old Gutenberg-Richter energy-magnitude relation

$$\log E=12+1.8M$$

we see that the equivalent earthquake magnitudes of 1-kiloton, 10-kiloton, and 100-kiloton explosions would be 4.2, 4.8, and 5.3, respectively. In passing, we note that a 1.7-kiloton explosion would have a magnitude, according to this formula, of 4.35, a value close to the observed value for the Rainier explosion. Gutenberg and Richter (Seismicity of the Earth, 2d edition, Princeton, 1954, p. 10) state that shocks of magnitude below 5.3 are well recorded at stations less than 600 miles from the epicenter (10°). We are dealing here with sources whose magnitudes are not comparable to those of large earthquakes. Small earthquakes may be detected at distances larger than the confidence limit above but not reliably so. For the 1-kiloton shots, the range of observation is reduced from 600 miles to about 300 miles (5°).

A local network of stations, such as that operated by Pasadena or Berkeley can locate local epicenters, if shocks are well recorded, to an uncertainty of the order of 5 kilometers (3 miles). These irregular nets of stations are of the order of 50 or 75 miles lattice spacing.

For large earthquakes, from the data of many stations, epicenters are given by the United States Coast and Geodetic Survey to an accuracy of ½° (about 50-mile accuracy) and times are given to about 1 second. For smaller earthquakes, origin times of the order of 1 second are possible and epicenters of the order of 3 miles as indicated above are also possible. All these features are based upon the assumption of satisfactory recording.

The criterion of accuracy in question 6 is of course one of degree. With a net 50 miles on a side an accuracy of the order of 3 miles is certainly possible.

Questions 5, 7, and 8: These questions assume that earthquake sources and underground explosion sources would produce markedly different records at some distance. We have analyzed the mathematical problem of a shear source (earthquake source) and a dilatational source (explosive source) in a homogeneous region overlain by a single homogeneous layer. We find that, superficially, the seismic records that we predict at distance are indistinguishable as to nature

of source (earthquake or explosion) or depth of source (i. e., whether the sources are surficial as in explosions or at depth as in earthquakes) when the sources are restricted to lie in or on the upper layer. "At distance" refers to epicentral distances greater than a few thicknesses of the upper layer. To be sure there is a noticeable change in the fine structure of the theoretical records at distance with change in source type, but these are not diagnostic in the case of more complicated, unknown geometries. The predictions, even with the above "simple" geometry, show records of high complexity.

At short range—i. e., epicentral distances of the order of the layer thickness—the theoretical predictions are markedly different. Here the difference between earthquake and explosive sources will be in evidence upon single records; but again, for complex structures—i. e. many layers of the order of kilometer thicknesses—the sites where these features are diagnostic are located within only a few kilometers from the epicenter.

We conclude that single records are not diagnostic as to the nature of the source for practical ranges. It is geometry which determines the character of the records rather than the nature of the source.

If, however, several records are intercompared from stations surrounding a source, then diagnostic material can be obtained. The criterion for this analysis would come from "first motion" studies. The first motions at a suite of stations surrounding the epicenter should all be "up" in the case of an explosion. These motions should be "up" at some stations and "down" at some stations in the case of an earthquake source. This difference should be reliably detectable at stations say at range one-half the detectable limit (see question 3). For the minimum size suggested, a grid of stations about 50 to 100 miles on a side would be a minimal value. With a fine enough grid this method of identification is diagnostic.

Question 9: Unambiguously? Not if chance, artifice, etc. are factors.

Questions 10 and 11: This question assumes that nuclear explosions will have different properties than nonnuclear explosions of the same energy. The only differences I can imagine between these two types of explosion are (1) rise times of the onsets of pressure, (2) different linear dimensions of the equivalent source, (3) duration (or frequency) of the source. I do not have enough information to respond authoritatively to this question but my guess is that if any differences do exist they will only be observed at seismic stations at the epicenter or near it, say a kilometer away or so. Beyond this distance the geometry of the strata will mask any features characteristic of the source.

Question 12. The reference for this question is again Gutenberg and Richter (op. cit.). They cite activity in the Crimea and the Caucasus (p. 68), a shock of magnitude 6 in the Urals (p. 242), and much activity in the Kuriles, Sakhalin, and Kamchatka area (p. 57). China has great activity (pp. 67, 73) from strong, shallow earthquakes. Szechuan, Tibet, Mongolia, and the Lake Baikal area are all active (pp. 207–209, 241–242). Further, on page 88, the above authors state, "Minor earthquakes occur almost anywhere. Practically all existing seismological stations have recorded local earthquakes in their immediate vicinity."

Questions 15 and 16. I would extravagantly suggest a grid of stations 50 miles on a side. If taken over the entire area of the earth, this would require 20,000 stations. Taken over the area of the Soviet Union and China, this would require about 5,000 stations. These stations, studying first motions, could probably determine sites and discriminate between earthquakes nad explosive sources in a majority of cases. Short-period seismometers should be used. No discrimination between types of explosive sources would be possible.

The reliability of such a system would probably still be quite good if the grids were increased to 100 miles on a side, reducing the number of stations by a factor of 4. The response would be, of course, poorer.

The above number of stations is, of course, not a practical one. However, first motions can reliably be detected out to about 300 miles or so for 1 kiloton, although with reduced epicenter resolution. At a grid spacing of 300 miles, or about 100,000-square-mile coverage per unit of the net, the number of stations required to cover the area of the Soviet Union and China is thus about 100 stations.

Taking into account irregularities of border, about 150 seismic stations, equipped with short-period seismographs, adapted to the problem of the detection of first motions, should handle the problem. At this spacing, the epicenter resolution would probably be of the order of 10 miles or so. On-the-spot detection to locate foci in 100-square-mile regions is, of course, most difficult.

Question 17. On-the-spot inspection teams would have to search areas comparable to the uncertainty in epicenter location; i. e., about 10 square miles. I do not know of any critical surficial evidence that could be used. The important feature is that the seismographic stations be near the sources and not at remote points thousands of miles away.

Question 18. I would first *study* the possibility of constructing *shaped* nuclear charges; that is, charges which would be directional in the way they release their energy, rather than omnidirectional, as I assume present nuclear weapons to be. Second, I would attempt to introduce baffles or some device so that if a nuclear explosion were shot *toward* the *bottom* of a deep, interior cavity, the ground wave striking the earth's surface might come in before the air wave through the cavity volume. There are some physical reasons why the second suggestion is not practical at the present. This is pure conjecture, as I do not know whether studies upon shaping nuclear weapons have been made or are contemplated.

Shooting two or more charges side by side does not alter the main feature of a net dilatation source for an explosion or explosions, even if shaping occurs. However, stations close to the epicenter may receive misleading information and the data from remote stations would have to be used; for small shocks, remote stations would be too feebly exicted to give useful information. I am certain that other evasive actions could be taken which do not come to mind at the present time.

Question 19. Shoot deep, with a low yield, and in a seismically active region.

Sincerely yours,

LEON KNOPOFF,
Associate Professor of Geophysics.

Reply of Prof. L. Don Leet, Seismologist in Charge, Seismograph Station, Harvard University

HARVARD UNIVERSITY,
SEISMOGRAPH STATION,
Harvard, Mass., May 15, 1958.

Hon. HUBERT H. HUMPHREY,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: This delay in replying to your letter of April 9, and filling out the accompanying questionnaire on seismic detection of underground explosions, has been occasioned by my deep concern over the problem, rather than indifference or procrastination. In the present state of seismological instrumentation and experience, most of the questions simply cannot be answered with useful precision. I'll do the best I can in the following, then brief you on what is being done to remedy the deficiencies.

1. For over 25 years, the study of seismograms from underground explosions has been my special field of investigation. This has included up to 700 tons of commercial explosive, and development of my own seismograph for close-in studies. Some of these were used under my direction to measure ground motion at the first A-bomb test in New Mexico.

2. I know of no technique, other than seismic, that would offer any prospect for the successful detection of underground nuclear tests.

3. With present instrumentation, I believe an underground explosion might be recorded in some manner, though not usefully, at distances of—

	Miles
1 kiloton	800
10 kilotons	1,200
100 kilotons	1,500

These ranges could be extended considerably with relatively little research and development.

4. Under the circumstances of question 3, records of sufficient quality to permit an accurate epicenter determination might be obtained at distances of—

	Miles
1 kiloton	400
10 kilotons	600
100 kilotons	750

(There is an important unknown that influences the answers to questions 3 and 4—the rock or material in which the explosive is buried, and the manner in which it is buried.)

5. The records probably would not contain diagnostic information that would aid in distinguishing between an earthquake and an underground explosion at distances greater than those of question 4.

6. This would depend on the stations' distribution in direction from the source. Three might do it, under favorable conditions. Ten might fail to do it accurately. Under the best conditions, location within a circle of a radius of a mile might be possible. This depends on the distance, as well as the station arrangement, and all these answers assume presently available equipment and methods. With modernized instrumentation, both distance and accuracy could be increased substantially.

7. With present equipment, I'm not sure how to answer this. From what we do know, however, I believe it would be possible, with proper equipment, to make positive identification on 100 percent of disturbances located. Relative energy in P and S, earth periods in general, and relative energy and periods in L would be diagnostic features.

8. I believe a single, complete record could provide identification, regardless of location, with proper instrumentation.

9. I believe that, from seismic evidence alone, we could determine unambiguously, that an underground explosion has occurred. This would be based on complete records from three or more stations employing modern instrumental techniques.

10. I believe that, from seismic evidence alone, it would be possible to determine, unambiguously, that an underground nuclear explosion has occurred, if (1) modern instrumental techniques were employed, and (2) the explosion exceeded 1 kiloton in energy.

11. I do not believe that the characteristics of a seismogram utilized for distinguishing between explosions and earthquakes would be affected by variations in the depth of the explosion, the nature of the surrounding strata, or the presence of absorptive or shielding materials in thicknesses less than half a mile in all directions (including below).

12. I haven't the data for answering this question at the present time.

13. The coupling to ground is generally more efficient, so smaller explosions send seismic waves to greater distances.

14. I have studied many seismograms from underwater explosions.

15. We have at this station an all-out research program in the planning stage, some objectives of which would have to be attained before this question can be answered, I don't believe the question can be answered at this time.

16, 17, 18, 19. (See 15.)

A great deal of information has been accumulated in seismology, with instrumentation that is archaic by modern standards of the making of physical measurements. But there is enough to know that, by applying modern measurement techniques, the area of useful knowledge can be rapidly and greatly expanded at relatively small cost in money or time. The Harvard seismograph station, now in its 50th year of continuous operation, is preparing to suspend routine registration of earthquakes and undertake a full-scale program of research in instrumentation and interpretation which would lead to definitive answers to most, if not all, of the questions raised by your committee.

As a matter of fact, I expect to be in Washington in the very near future in connection with organizing this program, and would be honored by an opportunity to discuss the whole problem with you, if you so desire.

Cordially yours,

L. DON LEET.

Reply of Prof. Henry Lepp, Department of Geology, University of Minnesota

UNIVERSITY OF MINNESOTA,
THE SCIENCE AND MATHEMATICS DIVISION,
DEPARTMENT OF GEOLOGY,
Duluth, May 12, 1958.

SENATOR HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: Attached is a reply to the questionnaire on seismic detection of underground explosions included in your letter of April 25. I have omitted several of the questions because I do not feel qualified to answer them.

Your letter was, no doubt, mailed to all seismological stations in the United States. In order that you will interpret my answers in proper perspective, I should tell you that I am a geologist and not a seismologist. For the past 3 years, I have periodically operated the seismograph station at the Duluth campus.

My purpose in operating the station has been to supply a service to seismological organizations and, at the same time, to utilize the instruments and buildings that we have here. Unfortunately, we have experienced considerable difficulty in obtaining money for student help and supplies to operate the station and, hence, it has been closed much of the time.

Yours very truly,

HENRY LEPP, *Associate Professor.*

ANSWERS TO QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS

1. I have had little or no experience with seismographs from underground explosions. Our Duluth station has supplied seismograms of nuclear explosions to the United States Coast and Geodetic Survey from time to time, and I have examined these seismograms.
2. I can think of no other technique that would detect an underground at considerable distance from the explosion center.
3. Unqualified to answer. I could refer to the literature and come up with an answer by establishing a relationship between kiloton and magnitude based on the recent Nevada explosion, but this would not be a personal contribution.
4. Unqualified to answer.
5. Unqualified to comment.
6. I believe that three stations would be an absolute minimum.
7. Have not had sufficient experience to comment intelligently.
8. Same as 7.
9. Yes, providing that there are sufficient stations and, of course, that the blast is sufficiently strong to be detected.

10. I do not believe it possible to distinguish unambiguously between an underground nuclear and a similar chemical explosion. However, since so much more energy is liberated by even a small nuclear explosion, as compared to normal dynamite explosions, the magnitude of the shock itself may indicate a nuclear source.

11. The depth of, and the geologic conditions around, an explosion should to some degree influence the resulting earth waves. It may be remotely possible to generate a real earthquake by a large explosion if the time and place of explosion were right. I consider this a very remote possibility.

12. I am not sufficiently familiar with the details of earthquake distribution to answer this question exactly. However, the fact that earthquakes are highly localized within certain unstable belts should be an important consideration in evaluating the soundness of seismic detection systems. Vast stretches of Russia constitute stable shield areas and are, normally, earthquake free. Here, detection of blasts over 1 kiloton should be relatively easy. In the unstable Pacific Belt or in the trans-Himalayan region there would be more work in distinguishing between earthquakes and blasts because of the relative abundance of earthquakes.

13. Cannot answer.

14. I have not studied them.

15. I am leaving this question to the seismologists, who are much better qualified to answer it.

16. As above.

17. I believe that an on-the-spot inspection team could identify a blast area if given sufficient time. This may be accomplished by (*a*) radiometric measurements of the area, particularly of air in joints and other openings in rocks; (*b*) drilling and measurement of thermal gradient.

18. I would set the explosion in an active seismic belt and, hence, increase the possibility of confusion with a natural phenomenon. I believe in most cases, however, such an explosion could be distinguished as a blast, providing that there were a widespread seismic network.

19. I believe that, in the case of a large underground explosion (50 kilotons plus), seismic stations located outside the Iron Curtain could identify the shock as an underground explosion. In this case, the nature of the seismogram would identify the shock as an explosion, and the magnitude would point strongly to a nuclear explosion.

HENRY LEPP.

L. DON LEET

Professor of geology, Harvard University; seismologist in charge, Harvard Seismograph Station; formerly chairman, division of geological sciences

Born: Alliance, Ohio, July 1, 1901.

Bachelor of science in geology at Dension University, 1923; doctor of philosophy in seismology at Harvard University, 1930; doctor of science (honorary) at Denison University, 1948.

Lived in Japan from December 1923 to February 1925.

Service during the war with radio research laboratory, Harvard University (radar countermeasures); underwater sound laboratory, Harvard University; measurement of ground motion at atomic bomb test, New Mexico, July 16, 1945.

Since the war, consultant on Isthmian Canal studies for the Panama Canal, 1946–47; for Tecon Corp. at Panama Canal's threatened slide, 1954; consultant, Office of the Chief of Engineers, United States Army, 1947–48; consultant on seismic prospecting, The Texas Co., 1947; consultant for TVA on ground motion from the largest quarry blast in history, 1,362,985 pounds at South Holston, Tenn., February 5, 1949.

Developed Leet 3-component portable seismograph for recording vibrations from explosions and industrial sources. Several of these were used at the atomic bomb test in New Mexico in 1945. They are also in use commercially and for research in the United States, Canada, England, Australia, Sweden, and Belgium.

Author of Practical Seismology and Seismic Prospecting (textbook), Vibrations from Blasting, and Blasting Vibrations' Effects, (manuals); Earth Waves (monograph); Earth Motion From the Atomic Bomb Test (article); Causes of Catastrophe (popular book on earthquakes, volcanoes, hurricanes, and tidal waves); Physical Geology, (textbook, with Sheldon Judson); Quarry Blasting With Short-Period Delay Detonators (article) and many other technical papers in scientific journals.

Reply of Rev. Daniel Linehan, S. J., Director, Weston Observatory

WESTON OBSERVATORY,
GEOPHYSICAL LABORATORIES OF BOSTON COLLEGE,
Weston, Mass., April 28, 1958.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament, Committee on Foreign Relations, United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: I am returning with this letter the answers to the questionnaire that you sent to me on April 9. I trust that these are sufficiently clear and that no further explanation is required.

However, if there is any matter that I have not sufficiently explained myself, please do not hesitate to ask for further clarification.

With best personal wishes, I remain,

Very sincerely yours,

WESTON OBSERVATORY,
DANIEL LINEHAN, S. J., *Director.*

ANSWER TO QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS

1. I have had considerable experience studying seismograms of underground explosions during the past 25 years. Most of these concerned quarry blasts or submarine blasts.

2. The study of telluric currents or seismo-electric effects might have some result, but I have not worked with these methods to state how accurate or sensitive these methods might be. Microbarograms have been used in studying uncovered explosions, but should not be too satisfactory for the buried shots.

31345 O—58——36

3. This is difficult to answer, as much depends upon the method of packing the charge, the depth of packing, and the geological structure of the mine where the explosion took place. Given optimum generation conditions, and instruments designed for such recordings, I believe that 1 kiloton could be detected for several thousands of miles.

4. Again the quality of the records would depend upon the conditions of the charge as outlined above. Also, methods could be developed where several stations might locate an epicenter, although the quality of the records would not permit a single station to make a location.

5. Answer unknown without suitable tests. I have worked with records of blasts up to 300 miles, where distinction could be made.

6. Depending on the station locations, the type of equipment, etc., three would be minimum.

7. Within the distances that I have studied, I would say that a blast could be distinguished from an earthquake. For greater distances tests would have to be operated. In the past we have used the amplitude ratio of the P and S phases for distinguishing the type of disturbance. With several stations operating from various azimuths from the epicenter the time of closure of the origin times could be used. I feel that 90 percent of the disturbances could be identified.

8. The number of stations required for optimum identification would depend upon the area to be studied, the range of the instruments, the types of explosions, etc. I do feel that answers cannot be given without considerable testing.

9. These circumstances are given above.

10. No.

11. Yes. Compare conditions mentioned above.

12. Answer unknown.

13. Depending on the depth at which the explosion took place, the amount of energy transmitted is usually greater underwater. The surface waves have different appearances than those from an underground shot.

14. I made a considerable study of submarine explosions during World War II.

15. The total number of stations required, their location, the personnel requirements, etc., could only be determined after suitable testing to determine the best type of instruments to use, the range of these instruments, etc. As the instrumental range increases, then the number of stations required could be decreased. With an accumulation of test records, then methods could be developed that might raise the percentage of accuracy in determining that a disturbance is nuclear.

In our present state of knowledge it is quite impossible to give definite answers to some of these questions.

The cost of a station installation, exclusive of personnel salaries, but including a small building, developed instruments, accurate clocks, accurate cyclage and voltage controlled power supply, might be about $150,000.

16. Perhaps less than 10 percent.

17. Yes; an inspection team could be directed to the area. The size of the area to be studied would depend again, on the range of the instruments, the position of the recording stations, the type of explosion, etc.

18. If the explosive material were loosely packed and tamped, or if the geological conditions of the mine were such that they would cushion any shock then the energy might not be transmitted too far. There is also the possibility that several explosions might be set off with slight delays, and the effect of one could mask another confusing the interpreter of the grams.

19. In the absence of seismic detection equipment of sufficient range, I am uncertain what other equipment might be used to detect such an explosion of any size. Perhaps the use of seismoelectric effects might be made, or telluric current changes.

ADDENDUM

From the answers I have given above to the questions proposed, it will be noted that I believe that the proper seismic instrumentation has not been developed as yet for this precise work. Or, that the equipment has been developed, and I am unaware of its sensitivity, design, period, etc. It is possible that the proper instruments are already in operation and for security reasons have not been made known to everyone.

I do feel, however, that not enough controlled experimentation has been done on the location of buried blasts. Lately, quarry operators have been forced into using delayed blasting to decrease damage to neighboring buildings, and as a result the type of grams from these blasts have been unsuitable for study. Complete and instantaneous explosions are required.

Reply of Rev. J. Joseph Lynch, S. J., Director, Seismic Observatory, Fordham University

FORDHAM UNIVERSITY,
SEISMIC OBSERVATORY,
New York, N. Y., June 2, 1958.

Senator HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Committee on Foreign Relations,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: As explained in my note sent a day or so ago I have just gotten off a boat from Europe—but here is my very hurried answer to your questionnaire.

Sincerely,

JOSEPH LYNCH, S. J.,
Director.

QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS

1. Since 1936 we have operated short-period seismographs which regularly record quarry blasts, etc., and during the Second World War—ashcans, etc., dropped off Atlantic coast.
2. This calls for further thought.
3. Not beyond 500 to 600 miles.

4. With present equipment not beyond 600 miles approximately. Time would be accurate within a second or so—location, a mile or so.

5. At any distance. The record of an artificial explosion can be differentiated from a natural earthquake: The former is a point-source whereas a natural quake has an extended source; the compression phase of the record is short lived in the former; and more prolonged in the latter.

6. Three, provided they are not all on one line.

7. Yes; the duration of the compression phase as mentioned under 5; close to 100 percent.

8. Increasing the number of stations will increase the accuracy of location, but not the differentiation between a quake and an explosion; one station alone will do that.

9. Yes; provided the source is close enough for compression and shear waves to reach the observatory.

10. No.

11. No.

12. I would have to consult International Seismological Summary or Gutenberg or Strasbourg Bulletins to answer parts 1 and 2. Comparisons are odious is the best answer to part 3. On available data at least 10^{20} ergs.

13. This question is ambiguous. Is the source or the receiver referred to as under water?

14. Only to the extent that during the last war—explosions from ashcans were regularly recorded here; occasionally, still, we pick up activity from the Atlantic.

15. As many small concealed seismometers as possible should be set up within 600 miles of all likely clandestine testing sites. The recording of these seismometers could be done miles away. No personnel would be needed at the seismometer site. Both earthquakes and explosions would be recorded without fear of their being confused. Small seismometers of the Willmore type would seem practical. More thought is needed for a fuller answer to this most practical question of the whole questionnaire.

16. Very few.

17. Yes to part 1, no to part 2, and further thought to part 3.

18. I would need more time to formulate an answer.

19. I feel that our present seismic personnel at United States Coast and Geodetic Survey, California Tech, California, Columbia, Weston, St. Louis, etc., could devise a foolproof test to reveal any clandestine violation.

Reply of Leonard M. Murphy, Seismologist, Coast and Geodetic Survey

MAY 15, 1958.

1. I have seen a number of seismograms from underground explosions over a period of many years but have not made any thorough studies or conducted special investigations.

2. I know of no methods other than seismic for detecting underground nuclear explosions placed deep enough to prevent the escape of radioactive debris.

3. Distances for detecting underground explosions with yields of—

1 kiloton: 300 to 500 miles

10 kilotons: up to 3,000 miles
100 kilotons: all sensitive stations within P range (7,000 to 8,000 miles).

These distances are based on present instrumental capabilities. With improved, more specialized instruments, these distances would naturally increase.

4. Since the basic procedure for locating the source of an explosion is the use of a simple form of triangulation, 3 stations situated on azimuths approximately 120° apart would suffice. The stations situated at distances given in question 3 would necessarily have good first arrivals. If there is any doubt about the first arrivals, additional stations are required to locate the source. Frequently in earthquake work which uses the same principle we are able to determine an epicenter with 3 stations and later find the location confirmed by data from additional stations. Such locations may be accurate to the nearest 5 to 10 miles in latitude and longitude and ± 3 seconds in time.

5. The records would be good for locating the source but would not provide data for distinguishing between an earthquake and an underground explosion.

6. As stated in No. 4, 3 stations with good first arrivals which may be scaled to the nearest 0.1 to 0.3 second would suffice but more confidence could be placed in the locations if additional station data were available for confirmation. These stations must be within the ranges where good recordings are obtained.

7. There is no positive means for differentiating between a blast (underground explosion) and an earthquake. For a blast the initial motion when clearly recorded is a compressional type movement. In an earthquake it can be either a compression or rarefaction. Information is unknown whether 100 percent, 90 percent, and 50 percent of these disturbances can be identified.

8. Six stations located in three different azimuths and within the range for recording good initial movements would provide a possible source of identification. However, in giving an answer to this question it should be realized that from the records alone we have only the compressional wave theory for distinguishing blasts and earthquakes. If rarefaction and compressional waves are recorded by these six stations the source is very probably an earthquake. If only compressional waves are recorded the source could be a blast.

9. I have no reason to believe that an underground explosion can be identified unambiguously from seismic evidence alone. There is a possibility of such detection if the blast occurs in a definitely nonseismic area.

10. Same reply as in No. 9.

11. The seismogram would be affected by physical conditions at the source of the explosion.

12. Natural earthquakes in U. S. S. R. for magnitude—
4.25 to 6: 300 per year.
6 or higher: 75 per year.

13. I do not have information about relative energy obtained from nuclear explosions under water and under ground.

14. I have observed seismograms from underwater explosions but have not studied them.

15. (*a*) At the present time sufficient information is not known for distance ranges over which good recordings can be obtained from

nuclear explosions. The Rainier blast (1.7 kiloton) was recorded poorly up to distances of 2,300 miles by conventional seismographs. By the use of special type seismographs and special analysis of the records, recordings for the recent Ripple Rock explosions (2,673,000 pounds of Nitromix) were obtained from distances of 1,700 miles and approximately 3,000 miles. (*b*) If we assume a minimum energy of 1 kiloton there would be need for approximately 100 stations. This total might be reduced if many of the existing 450 stations in the world could be used in this program. (*c*) Personnel required: there is a question as to whether the stations could be operated by our scientists or by local scientists supervised by United States seismologists. Using the latter method, it is possible for a small group of United States scientists to manage a number of stations by periodically visiting and analyzing the seismograms. All records would be collected and filed under United States control. (*d*) and (*e*) As in reply 8. (*f*) At least a year would be required for construction and delivery of instruments to the chosen sites, training of personnel and installation of equipment will require a year to 2 years; a good 2 years will be required to make the system operative. (*g*) Seismometers recommended would be the Benioff and possibly special geophysical types with special recordings (for final decision more information is needed about improvement of instrumentation). (*h*) Cost of system: To organize and establish, 10 to 12 million dollars; to maintain and improve after original system is established, $8 million per year. (*i*) This system could not identify an underground explosion as a nuclear explosion unless the ground was blown out and other means could be used to detect radioactivity.

16. It is difficult to guess just how many underground explosions would go unresolved. The percentage can be greatly reduced by inspection, i. e., by scientists and other visiting or inquiring about suspected activities.

17. First two parts of question answered in No. 16. The area depends upon the accuracy of the seismic epicenter, possibly 10 miles square. A blowout would simplify the inspection for any nuclear explosion because of radioactive accumulation.

18. The blast should be carried out in seismic land areas and if possible during earthquake swarms. There should be no blowouts and no possible source for detecting radioactivity in the air or in ocean currents.

19. To hide the tests it is best to keep the energy yields low. Underground nuclear explosions of 10 kilotons yield if in nonseismic areas would probably be detected—if in seismic areas as stated before it is difficult to distinguish, so some would go undetected. Above 10 kiloton explosions, provided there are a number of them, would be detected if in nonseismic areas. If they occur during earthquake swarms there is very little likelihood for detection.

Reply of Otto W. Nuttli, Assistant Professor of Geophysics and Geophysical Engineering, St. Louis University

ST. LOUIS UNIVERSITY,
INSTITUTE OF TECHNOLOGY, DEPARTMENT OF
GEOPHYSICS AND GEOPHYSICAL ENGINEERING,
St. Louis, Mo., May 14, 1958.

Hon. HUBERT H. HUMPHREY,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: Enclosed are my comments concerning the questionnaire "On Seismic Detection of Underground Explosions." I hope that these comments will be of some value to the Subcommittee on Disarmament of the Senate Committee on Foreign Relations.

COMMENTS

1. My study of seismograms from underground explosions has been limited. It consists of a study of the seismograms of St. Louis and Florissant for the Rainier test in Nevada on September 19, 1957. I have seen reproductions of seismograms of this date for "near" and "distant" stations at a technical paper presented at the 1958 annual meeting of the Seismological Society of America.

I have also studied the seismograms of St. Louis and Florissant for the dates of 14 additional United States nuclear explosions, which were listed as ground, barge, tower, or balloon shots. Information concerning the location and time of detonation of these explosions was recently declassified and released on April 15, 1958.

2. I cannot suggest any technique other than seismic that would be useful in detecting underground nuclear tests placed deep enough to prevent the escape of radioactive matter.

3. An underground nuclear explosion of equivalent yield of 1.7 kilotons (Rainier) occurring at an unknown time and in an unknown, place could be detected only at distances substantially less than 1,200 miles. My statement is based on the appearance of the Fayetteville, Ark., seismogram of the Rainier test.

I do not possess the necessary information to know the distances at which 10-kiloton and 100-kiloton explosions could be detected.

4. For a 1.7 kiloton explosion, it should be possible to determine the epicenter accurately from stations of less than 300 miles distance. (The latter figure is probably a somewhat conservative one.) The time could be determined with an accuracy of 1 second, and the location with an accuracy of about 5 miles. The latter values would assume that the seismologist had previous information concerning the geological structure of the region.

5. From my observations of the 15 explosions mentioned in No. 1, I can say that nuclear explosions recorded at a distance of approximately 6,500 miles (the distance from Bikini to St. Louis) have certain peculiar features which enable them to be distinguished from earthquakes.

The reproductions of the seismograms of the Rainier test from "near" seismograph stations lead me to the conclusion that it is much more difficult to differentiate between an earthquake and a nuclear explosion at a distance of a few hundred miles.

6. In theory the minimum number of stations required to obtain an accurate epicenter location is three. In practice, the number is larger, because one must be certain that the seismic waves which are being used for this epicentral location have all originated from the same source, and that they are not caused by separate local earth disturbances in the vicinity of the various seismograph stations. Also, the location and spacing of the seismograph stations would influence the number required to locate the epicenter accurately. I would estimate that approximately 10 properly spaced seismograph stations would be the minimum number required.

7. The differentiation between a blast and an earthquake would, in my opinion, depend more on the distance than on the number of stations. At the large distances (I can only speak with certainty of the St. Louis distance from Bikini of 6,500 miles) one of the prominent wave types produced by earthquakes, the shear wave, does not appear on the seismograms of nuclear explosions. This is a very distinctive feature. If the epicenter can be located, it should be possible in all cases to identify the disturbance as an explosion, rather than an earthquake, on the basis of the lack of shear waves at stations several thousand or more miles from the source. This would assume that the explosion could be recorded at these distances.

The above statements do not apply for stations located within a few hundred miles of the explosion. For these stations the shear waves do appear (they are caused by reflection of other type waves at boundaries within the earth), and the seismograms look very similar to those of natural earthquakes.

8. I do not believe that increasing the number of stations would aid in differentiating between a natural earthquake and an explosion.

9. See No. 7.

10. From seismic data alone I believe that we could determine unambiguously that high energy yield underground nuclear explosions have occurred. However, I do not believe that low energy yield nuclear explosions, which are well recorded only to a distance of a few hundred miles, could be unambiguously identified.

11. I do not believe that variations in the depth of explosion, the nature of the surrounding strata, or the presence of absorptive or shielding materials could camouflage a high energy yield explosion recorded at distances of several thousand miles from the source.

12. I do not know how many earthquakes of magnitude 4.25 to 6 or greater than 6 occur annually in the U. S. S. R. and China. However, such information is not secret, and it could be found in the scientific literature of those countries.

I cannot say what size explosion would produce a magnitude of 6, because little information has been released concerning the energy of these explosions.

13. I do not know the answer to this question.

14. I have not studied any seismograms from underwater explosions.

15. I cannot give the exact number of earthquake stations required to locate any clandestine tests in the U. S. S. R. and China because

I do not know the greatest distance at which waves from a 1 kiloton explosion can be used to locate the source. Assuming that this distance is approximately 300 miles, it would require approximately 200 seismograph stations located in these countries. The seismometers to be used should be sensitive electromagnetic ones, with a natural period of about 1 second. Suitable seismometers would be the Reeff (used at St. Louis University), the Benioff, or the Willmore.

I do not feel qualified to answer the remaining questions of this section.

16. I do not know, since the answer to this question would depend upon the answer given in No. 12.

17 and 18. I do not know the answers to these questions.

19. Assuming that our H-bomb tests in the Pacific in the years 1954 and 1956 had an equivalent energy yield of 1000 kilotons (based only on information obtained from newspaper accounts), I believe it would not be possible to conceal an underground explosion of such magnitude. Such an explosion could be identified from the data of the present seismograph stations operating in the "non-Soviet world." I do not possess sufficient information to comment upon the positive identification of explosions in the 10 kilotons to 100 kilotons range.

Sincerely,

OTTO W. NUTTLI,
Assistant Professor of Geophysics and Geophysical Engineering.

Reply of Dr. Jack E. Oliver, Seismologist, Lamont Geological Observatory

COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK,
DEPARTMENT OF GEOLOGY,
LAMONT GEOLOGICAL OBSERVATORY,
Palisades, N. Y., April 28, 1958.

Senator HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: Answers to the questionnaire on seismic effects of nuclear explosions which was recently sent to me are enclosed. Some of the answers are not as specific as the subcommittee might wish. This is primarily because of numerous complicating seismological factors which are not well understood.

In this connection, I would like to point out some seismic effects which have good possibilities of providing valuable information on explosions, but which are not yet sufficiently studied and understood so that they might be considered operational.

One concerns seismic waves of long period, primarily surface waves. The stations of the Lamont Observatory's network specialize in the recording of these long-period waves and I have made several studies, some classified, of such waves generated by explosions. There is ample evidence that these waves can furnish additional and valuable information for purposes of detection and of identification of the nature of the source.

A second possibility relates to the distribution of frequencies within the source. There is some evidence that explosions might be richer in high frequencies than earthquakes, in which case another possible means of distinguishing between the two would follow.

It would appear that a research program along these two lines would produce valuable results very quickly, probably in less than 1 year.

In the event that agreement cannot be reached between the two countries on the matter of the right of inspection parties to travel freely within the country, I offer the following suggestion. Let the tests be held underground, providing they are below a certain size Let the definition of the size, however, be in terms of amplitude on the seismological record rather than in absolute energy units. In this way the limit can be defined much more precisely and policed much more effectively.

Very truly yours,

JACK OLIVER, *Seismologist.*

QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS

1. I have appeared before a panel of the President's Science Advisory Committee concerned with the problem of detection and identification of underground nuclear explosions. In this connection I examined most of the seismograms of the Rainier explosion in some detail and also was made aware of some of the classified material on this subject. I also attended the meetings of the Seismological Society of America in March 1958 at which papers based on the Rainier explosion were presented.

Having made some studies, currently classified, of seismic surface waves from nuclear explosions, I examined seismograms from three stations in Eastern North America for seismic surface waves from Rainier. Surface waves differ from the more conventional and more frequently discussed body waves in that they follow the earth's surface rather than penetrating the deep interior. No such waves were found at the eastern stations from Rainier, either because of small excitation or a moderately high noise level at the time of the blast. Such waves have been found at great distance from somewhat larger explosions above ground, however. They are the subject of the classified papers.

I have also studied seismic waves generated by conventional explosions ranging in size from small detonations to large quarry blasts for about the last 10 years.

2. No.

3. This question is difficult to answer briefly since so many complicating factors are involved. Of special importance are the environment of the explosion and the noise level at the recording site. An example of the latter effect can be found in the case of Rainier. This shot was detected weakly at College, Alaska, but undetected at all stations on the east coast of the United States, all at about the same distance, presumably because of the higher noise level there. On the other hand, Rainier appears to have made relatively small seismic waves for an explosion of that size. For example, quarry blasts of the order of 0.04 kilotons are regularly recorded at distances of the order of 200 miles.

With these qualifying remarks in mind I would make the following estimates.

Size:	*Maximum distance generally detectable*
1 kiloton	400 to 700 miles.
10 kilotons	2,000 to 4,000 miles.
100 kilotons	Worldwide.

4. Size:	*Sufficient quality for accurate epicentral location at—*
1 kiloton	300 to 500 miles.
10 kilotons	1,000 to 2,000 miles.
100 kilotons	Worldwide.

5. Size:	*Diagnostic information for identification*
1 kiloton	About 200 to 400 miles.
10 kilotons	About 1,000 miles.
100 kilotons	Worldwide.

6. Theoretically 3, in practice, at least 4 or 5.

7. Not with certainty with present techniques. The best method is probably the use of the initial motion on the seismogram. One definite dilation would identify the event as an earthquake. However, the converse—i.e., no dilation means an explosion—is not true when the network and area of detection are limited. Assuming 4 stations recorded the shock well, about 80 to 90 percent of the shocks could be definitely identified as earthquakes if they all were. The nature of the source for the other 10 to 20 percent would be uncertain.

8. The more the better, of course. Taking 10 as a practical limit for the small bombs the percentage identified as earthquakes would be in the high 90's.

9. This could be done with almost 100 percent certainty if the explosion were large enough to be recorded throughout the world.

10. Yes; under the conditions of question 9 and providing the magnitude is so large that conventional explosives are not a possibility. If the magnitude is so small that conventional explosions could have been used, I see no way to differentiate between nuclear and conventional explosions.

11. Certainly the distance to which the bombs can be detected can be affected by any of the above. This, in a sense, affects the identification capability. It might also be possible to alter the first motion pattern by appealing to depth and topographic effects, but this is speculative.

12.

Magnitude	In U. S. S. R. and nearby offshore areas	In China
4.25 to 6	About 100	About 500.
6	About 20 to 50	About 50–100.

Depends on coupling to ground. Roughly about 100 kilotons.

13. It is much, much easier, not only to detect, but to identify a nuclear explosion fired at some depth in the sea because of the following:

1. Seismic waves of large amplitudes are excited because of good coupling with the water. Waves apparently from the

atomic explosion of Operation Wigwam off the coast of California were recorded all over the world.

2. The compressional and shear types of body waves have a unique and characteristic appearance which would not be confused with the same waves from an earthquake.

3. The seismic surface wave train includes modes and portions of modes not observed when the source is an earthquake.

4. In addition to the seismic waves, a sound wave (T-phase) of great amplitude is set up in the water.

5. I believe that gravity waves are also set up in the water.

14. I have made a fairly detailed study of the seismic waves, particularly the long period surface waves, from the shock that was apparently the atomic explosion of Operation Wigwam. I say apparently because the exact date and time of explosion have never been declassified. The paper resulting from this study will be presented orally at the meetings of the American Geophysical Union in Washington in May 1958 and the paper is scheduled to be published in the Transactions of the American Geophysical Union in June 1958. To the best of my knowledge this is the only study on the seismic surface waves from this shock, possibly the only completed study of seismic waves. A paper on the sound waves in water has already appeared in print.

15. I would accept the estimates on this from the Government sources with which I am familiar. (See question 1.)

What percentage of the earthquakes normally occurring in these regions could be correctly identified?

Eighty to ninety percent of the earthquakes would be correctly identified.

What is the probability of an explosion being incorrectly identified as an earthquake?

Perhaps 10 to 20 percent.

How long would it take to install such a system?

This would depend primarily on the logistics and cooperation of the country in which the site is located. Seismic equipment might be had in 6 months to 1 year.

What type of seismometers would you recommend to be used?

Benioff short-period seismographs. Long-period instruments of the type used by the Lamont Geological Observatory-IGY program and manufactured by Sprengnether and by Lehner and Griffiths.

What would you estimate the cost of the system you have described?

Rough estimate $50 million to $100 million.

Would such a system be capable of identifying an underground explosion as a nuclear explosion?

Only if the explosion were larger than could be built up from conventional explosives.

16. Five to twenty-five per year. This is a rough guess.

17. For a small or moderately large explosion this would be very difficult if real efforts were made to hide the explosion.

About what area in square miles would the inspection team be required to search for each event?

About 10 square miles.

What types of evidence would the inspection team find useful in identifying an underground explosion?

A seismic reflection survey might help if done in detail. Drilling, of course, might be required.

18. To hide an explosion some or all of the following measures might be taken:

1. Use a relatively small explosion.
2. Fire it in a highly seismic area.
3. Arrange it to go off more or less simultaneously with a local earthquake.
4. Arrange it to go off simultaneously with the arrival of compressional waves from a distant earthquake.
5. Fire it beneath a region where surface evidence of tunneling, etc., would be easy to conceal. Stress this concealment.
6. Fire near a coast so that seismograph stations are limited to roughly 180° of azimuth from the shot point.
7. Use the depth of the source and possibly topography in the vicinity of the source to distort the radiation pattern.
8. Conduct research on this problem. Since virtually nothing has been done on this subject, research is almost certain to produce new methods and techniques that might be used.

19. The methods described in 18 apply equally to this question.

10 kilotons: could be hidden.

50 kilotons: I doubt that 100 percent certainty would be obtained.

100 kilotons: probably could be definitely identified as a nuclear explosion on size.

1,000 kilotons: for all practical purposes this could be identified with 100 percent certainty.

JACK OLIVER,
Seismologist, Lamont Geological Observatory, Palisades, N. Y.

Reply of Dr. Thomas C. Poulter, Director, Poulter Laboratories, Stanford Research Institute

STANFORD RESEARCH INSTITUTE,
OFFICE OF THE ASSOCIATE DIRECTOR,
Menlo Park, Calif.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
United States Senate, Washington, D. C.

MY DEAR SENATOR HUMPHREY: Your letter of April 9 asking that I answer the questionnaire on seismic detection of underground explosions has been received. I have outlined my background in this field and am enclosing some material in this connection. Careful consideration has gone into the preparation of my answers and I hope the material will serve a useful purpose in this most important matter being considered by your subcommittee.

If I can be of further service, do not hesitate to call upon me.

Sincerely yours,

THOS. C. POULTER,
Director, Poulter Laboratories, Stanford Research Institute.

ANSWERS TO QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS BY THOS. C. POULTER, POULTER LABORATORIES, STANFORD RESEARCH INSTITUTE

APRIL 15, 1958.

1. My experience in seismic effects and in which I have studied seismograms has dealt primarily with man made disturbances and in the following fields:

(*a*) Studies of underwater explosions:

1. Long-distance signaling, such as sofar, by means of which it would be possible to obtain signals from a 2-pound explosive charge detonated at the proper depth in the ocean, completely around the earth if it were not for the shielding effect of the land masses.

2. Development of instrumentation for giving a crew of a submarine the exact location of each depth charge as it detonates.

3. Studies in the Antarctic for determining the thickness of the ice, the depth of the water below the ice if floating, and obtain information about the geologic stratification of the bottom.

4. Exploration for oil in the Gulf of Mexico and off the California coast.

5. Studies of the effect of firing 150-, 300-, and 600-pound explosive charges at depths ranging from a few feet to 1,000 feet in water that was 2,000 feet deep.

(*b*) Studies of underground explosions:

1. For geophysical seismic exploration for oil in Texas, Louisiana, Oklahoma, New Mexico, Colorado, Arizona, California, Canada, Alaska, and Venezuela.

2. For the location of the meteorite which formed the Canyon Diablo meteor crater in Arizona.

3. Explosive charges ranging in size up to 320,000 pounds for developing and calibrating instrumentation for making blast and earth vibration studies of the nuclear tests in Nevada over the past several years.

4. Studies in connection with both shallow buried nuclear shots in Nevada and the Rainier shot.

(*c*) Studies of explosions in snow and ice:

1. Geophysical studies in the Antarctic for measuring the thickness of the ice and snow, determine whether it was floating or resting on the bottom; if floating, how thick the water layer was and something about the stratification of the bottom.

2. Geophysical studies and exploration for oil in the United States Naval Oil Reserve No. 4 in northern Alaska.

3. Measuring the ice thickness on Taku Glacier and the Juneau Icefield.

4. On the Greenland icecap measuring the thickness of the icecap.

5. The development of a seismic technique for locating crevasses and determining their depth.

(*d*) Study of earth vibrations from explosions in air.

1. The development of the Poulter seismic method for geophysical seismic explorations for oil with more than 65 patents issued in my name.

2. Study of the transmission of shocks in homogeneous and rare homogeneous air and possible damage to building structures from comparatively small explosive charges.

3. Studies in connection with the nuclear tests in Nevada.

2. I know of no technique other than seismic whereby an underground nuclear shot can be detected, and I seriously question whether it will be feasible to differentiate between earthquakes and underground nuclear shots except in very special cases. Not enough information is available to date on the type of records that would be obtained from underground nuclear shots to answer this with certainty.

A very careful study should be made of all seismic signals and the presence of meaningful air waves should be looked for on all future underground shots.

Air waves transmitted over distances of as much as 500 miles through the air from comparatively small explosive charges are currently being used to measure the direction and velocity of the wind at altitudes of between 50 and 100 miles. I see no reason why the sudden rise of the surface of the ground over a wide area on underground nuclear shot would not create such an air wave detectable by a microbarograph. I would like to see this carefully investigated on all future underground shots.

3. I would anticipate that the greater the distance the more nearly underground nuclear shots will resemble earthquakes. Using the only data available, namely, the Rainier shot, I would estimate that a 1-kiloton would be recorded at 1,400 miles, a 10-kiloton at 3,000 miles, and a 100-kiloton over most of the earth; however, I would anticipate that the intensity would be so low that it could easily be lost in local background noises or passed up as having little or no interest. One would also anticipate from the Rainier shot that a 10-kiloton shot could not be felt at distances greater than 6.5 miles and a 100-kiloton shot at distances greater than 18 miles. My best estimate is that a trained observer would detect as something to be investigated a 1-kiloton shot at 350 miles, a 10-kiloton shot at 800 miles, and a 100-kiloton at 2,500 miles.

4. I do not believe there are enough data available at the present time to answer this. If recorded on three or more stations, the epicenter could be located with sufficient accuracy that if it were in a populated area by interviewing the people who were in the area at the time, he could most likely determine whether the area was small indicative of an underground shot or 600 times as great indicating an earthquake.

If the area were not populated, which would most likely be the case if it were a nuclear test shot, it could probably be located to within 5 to 10 percent of its distance from the closest seismic station recording the event.

This might still leave a very large search area, and an aerial search would be meaningless unless the weathered rock surfaces were a strikingly different color from the freshly broken surfaces. Judging from the Rainier shot a ground inspection team might well miss the surface cracks and similar evidences unless they passed within a horizontal distance less than half the burial depth.

The epicenter location for underground nuclear shots at comparatively short distances of 10 to 30 miles should be appreciably more accurate than for earthquakes, perhaps as close as 5 percent of the distance from the closest station.

5. There is not sufficient information available at the present time to answer this, except to say that the closer to the source the greater will be the difference between the records of an underground explosion and an earthquake.

6. This would be dependent upon their distance from the epicenter and their relative position, but under the most favorable conditions a minimum of three would be required; and the accuracy should increase with an increasing number of stations.

7. Not unless these stations were at a comparatively short distance from the disturbance and very good quality records were obtained. For short distances from underground explosions the pressure wave will predominate whereas the shear wave will be strong even at short ranges for earthquakes.

I believe it would be extremely doubtful if one could differentiate between the two 100 percent of the time even at a rather close range, perhaps 75 percent at a few miles and down to almost 0 percent at the greater distances.

8. Since the epicenter can be located from records obtained at great distances, and the maximum chance of identifying an underground explosion occurs only for relatively short distances, the spacing between stations would, of necessity, be rather small to provide maximum chance of identification. Since distant underground explosions look like earthquakes, the main purpose that would be served by stations far removed from the disturbance would be in confirming the location. It is more difficult to positively identify an earthquake from a long distance than it is an underground shot at close range.

All records will, therefore, have to be worked up in conjunction with the records from other stations in order to give any realistic appraisal.

9. I do not believe that it is possible to determine with complete certainty from seismic records that an underground explosion has occurred, unless a large number of closely spaced stations are employed.

10. From the experience with high explosive shots in Utah prior to the starting of the nuclear tests in Nevada and in Nevada prior to the Rainier shot, I do not believe it is possible, from seismic records alone, to differentiate between nuclear and high-explosive shots. I feel that it would, therefore, not be possible to positively identify an underground nuclear shot by seismic waves alone.

11. The characteristics of the seismograms used to distinguish between earthquakes and explosions most certainly would be affected by variations in the depth of the explosions, the nature of the surrounding strata, and the presence of absorptive or shielding material used to camouflage an explosion. Admittedly, a considerable quantity of material would be required to camouflage a large nuclear shot, but the site could be so selected that it would be in the midst of an almost unlimited quantity of absorptive material such as, for instance, thick, porous icecap.

12. The Rainier shot corresponded to a Gutenberg-Richter magnitude of 4.6, as determined from the stations located between 110 and 350 miles from the test detonation. An earthquake of this magnitude will produce perceptible vibrations of the earth's crust at a distance of 60 miles from the epicenter. However, I was at the observation

point 2½ miles away from the Rainier shot and did not, myself, feel any ground motion, even though I was watching for it and knowing when it would arrive. Some observers believed they did feel it, but it certainly could not have been detected if one did not know when to expect it. This leads me to believe that this effect, combined with the difference in the seismogram close to as compared to those obtained at much greater distances, provides the most important aid in identifying an underground explosion by seismic means.

I have no information on the number of earthquakes of the various magnitudes which do occur in the U. S. S. R. and China, but the figure must be enormous.

13. Underwater nuclear explosions would be very much easier to detect than underground shots.

(*a*) In the first place, an underwater nuclear shot, unless it is very small and extremely deep, cannot be completely contained, and some radioactivity would get out into the atmosphere.

(*b*) Considerable radioactivity could be detected in the water in the immediate vicinity for a short period after the shot.

(*c*) If it were in the open ocean, the sofar channels should pick up and record meaningful signals. This would not be true if it were in an area well shielded by land masses.

(*d*) If it were on the bottom and its location were accurately known, it could probably be detected by letting instrumentation down into the immediate area.

(*e*) If the shot point were not too well protected by land masses, it should be possible to detect the tidal-wave effect for considerable distance in calm seas.

14. My experience in studying seismograms from underwater explosions is outlined in (*a*) under question 1, above.

15. Even if it were economically and physically possible to establish such a system of seismic stations and their associated computation centers, when one considers the drain on trained personnel, the vast amount of data they would have to sift in proving the legitimacy of an enormous number of earthquakes, and then contrast with this the remoteness of the possibility of identifying an underground explosion as a nuclear explosion, the cost would seem to be completely out of proportion with the results that one could expect.

Rather than setting up a system of stations that would blanket the countries of interest, it would seem to be much more to the point to establish a comparatively small number of strategically located stations capable of shifting without notice. It would seem that such a system of mobile units which could be set up at a small percent of the cost and manpower would be an even greater deterrent than the unwieldly static system.

16. Unless some means is found for remotely detecting underground explosions which is more reliable than seismic, it will be surprising if most of them do not go undetected.

17. On-the-spot inspection teams directed by long-range seismic stations would spend most of their time checking on earthquakes which could probably never be identified. If an intermediate- to long-range microbarograph system can be worked out to record disturbances transmitted through the air, then a seismic equipped on-the-spot inspection team would have a much better chance of success.

31345 O—58——37

An on-the-spot inspection team would have great difficulty recognizing surface effects of even a large underground explosion from walking directly over the explosion point, particularly if the immediate surface had been otherwise disturbed in recent years and inspection from a low-flying plane would be meaningless.

The only positive evidence would be to drill or dig into the shot point and find the radioactive residue. This might take months even if they had the exact location. If the location were uncertain by a few hundred feet, as most likely would be the case, it might well be next to impossible to locate it.

18. Since an underground shot can be completely contained, it is only the surface operations and such minor surface disturbances as are caused by the blast that would in any way identify the area as a nuclear test site.

It would only be necessary to have a logical explanation for those two factors.

It would therefore seem that, if a nuclear shot were fired in conjunction with a rather large mining or quarrying operation, it might well be possible to conceal it from even the major portion of the personnel working at the mine or quarry.

The necessary underground tunneling could be conducted on the excuse of exploring the extent of the deposit. The security could be disguised in many ways, such as a safety measure to personnel, etc. Subsequent mining operations could proceed within less than 100 feet of an actual shot location without detecting radioactivity.

19. From the seismic results obtained on Rainier, it is estimated that nuclear explosions of as much as 170 kilotons can be conducted in the Nevada test site with safety.

I believe, therefore, it is highly probable that even a megaton bomb might be fired underground with a better than even chance that it could never be proven.

Reply of Prof. Frank Press, Director, Seismological Laboratory, California Institute of Technology

CALIFORNIA INSTITUTE OF TECHNOLOGY,
DIVISION OF THE GEOLOGICAL SCIENCES,
SEISMOLOGICAL LABORATORY,
Pasadena, Calif., April 24, 1958.

Hon. HUBERT H. HUMPHREY,
United States Senate,
Committee on Foreign Relations,
Washington, D. C.

MY DEAR SENATOR HUMPHREY: Enclosed with this letter are my replies to your questionnaire on seismic detection of underground explosions. I have no objection to your publishing the information which I have supplied.

It is a pleasure to cooperate with you and your committee.

Yours sincerely,

FRANK PRESS, *Director.*

1. I have examined seismograms from many underground explosions, both TNT explosions and the underground nuclear explosion, Rainier.

2. No.

3. Assuming use of the best possible instruments located at sites with least background disturbance: 1 kiloton, 1,000 kilometers; 10 kiloton, 5,000 kilometers or more; 100 kiloton, all distances.

4. Records would be of sufficient quality to permit accurate epicenter determination at the distances listed in 3, although principal use will be made of records at distances less than about 100°.

5. The main diagnostic information which would be of use in distinguishing between earthquakes and underground explosions is the presence of longer period body waves and surface waves. These events would be separated on the seismograms at distances beyond 1,000 to 5,000 kilometer.

6. The more stations reporting the more accurate the epicenter location. If I were in the detection business I would be reluctant to operate with less than 10 stations for a single determination.

7. With information available to me at the present time, I would say that 20 kiloton and higher blasts could be distinguished from earthquakes, blasts in the 1 kiloton class could not be distinguished from small local earthquakes. Where the crossover point occurs between 1 kiloton and 20 kilotons is questionable but could be answered by some experiments. The features of the seismic wave that I would use to make this identification are the spectrum in the body wave, particularly S, and in the surface waves. In addition, the type of surface wave would be diagnostic. For 20 kilotons and larger blasts this identification could be made for more than 90 percent of the cases. At the present time 1 kiloton blasts could not be distinguished from small earthquakes.

8. This is partially answered by 7. Small magnitude earthquakes could not be distinguished from 1-kiloton blasts. The greatest percentage of natural earthquakes are small ones.

9. From seismic evidence alone I believe that I would correctly identify as underground explosions 90 percent or more of 20 kiloton or higher blasts. With some research this figure might be lowered to the order of 10 kilotons.

10. A nuclear explosion could not be distinguished from an equivalent chemical explosion underground.

11. For all practical depths that could be achieved, variation in depth would not be a factor in altering the characteristics of the seismogram. The nature of the surrounding strata might affect the maximum range of detection to a certain extent, but this can be allowed for in determining the number of seismograph stations needed.

12. This is a question of earthquake statistics and has a definite answer. The research necessary to answer this question need only be done once, and I endorse Professor Richter's numbers.

13. A nuclear explosion in shallow water, if the explosion is completely tamped, would be equivalent to an underground explosion. A nuclear explosion in deep water would be much easier to detect because of the efficient propagation of sound in the ocean. Deep

hydrophones in the ocean could readily detect even the smallest nuclear explosions detonated in deep water.

14. I have studied seismograms from underwater explosions extensively.

15. Seismic stations will of necessity be established to assure the maximum probability of detecting a violation of a test moratorium. One hundred seismograph stations over an area the size of the Soviet Union would be required in my opinion. Of the order of 100 full-time people and 50 to 100 part-time people (working less than 1 hour a day) would be needed to tend 100 seismograph stations.

Probability of an explosion in the 20-kiloton or larger class being incorrectly identified as an earthquake is less than 5 percent, in my opinion.

It would take 1 to 2 years to install such a system after the apparatus has been delivered by the manufacturer.

I would recommend the use of the most sensitive short-period seismographs, such as arrays of short-period Benioff seismographs or the equivalent, as well as long-period seismographs with matched E–W, N–S and vertical components. The Press-Ewing instruments operated at 10-second periods would perform adequately for the long-period instruments.

The cost of this system per hundred seismograph stations would be of the order of $10 million.

This system could not distinguish between an underground chemical explosion and nuclear explosion.

16. In my opinion earthquakes of magnitude, say 4½ and less, could not be differentiated from an underground explosion in the 5 kilotons or smaller class without provision for field inspection. Earthquakes of magnitude of about 5½ or larger, and explosions in the 20 kilotons or larger class could be identified with an uncertainty of less than about 5 percent.

17. Provision for on-the-spot inspection teams directed to instrumentally defined epicenters would be a powerful deterrent against attempts at evasion. It is difficult, although not impossible, to remove evidence of tunneling and heavy machinery that would be necessary in preparing an underground nuclear explosion. An area of about 25 square miles may have to be searched for each event.

18. I would prefer not to answer this question, but I have considered this problem in determining the 5 percent probability figure quoted above.

19. In the absence of seismic stations in the U. S. S. R. and China, an underground test in the 2- to 10-kiloton class or smaller could be conducted in such a manner as to prevent our obtaining positive proof that a nuclear explosion had occurred. Fifty kiloton tests and larger could not be conducted without probable detection, the probability of detection increasing with the size of the explosion. I think we could detect a good percentage of tests between 10 kilotons and 50 kilotons.

Reply of Dr. Russell W. Raitt, Scripps Institution of Oceanography, University of California

UNIVERSITY OF CALIFORNIA,
SCRIPPS INSTITUTION OF OCEANOGRAPHY,
La Jolla, Calif., April 30, 1958.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: In reply to your letter of April 9, I have studied the enclosed questionnaire with care and I am impressed by the thoroughness of its preparation. Most of the important questions raised depend for their answers on observations of seismic waves from distant nuclear and chemical explosions and from earthquakes. Many of the answers are contained in the publications of seismologists working in this field, such as Professors Gutenberg, Press, and Richter of the California Institute of Technology, Professor Byerly of the University of California, Berkeley, and many others.

While I am acquainted with some of the results of these observations, the pertinent field of my own direct observations has been limited largely to study of seismic waves from explosions of a few pounds of TNT-like chemicals received at distances up to about 100 miles.

As the stated purpose of this questionnaire is to develop the facts, I will limit my answers to those questions on which I have had personal experience or which concern seismology in general:

1. In 6 years of commercial seismic exploration, I have studied many thousands of seismograms from underground explosions, most of them being a few pounds of dynamite. Charges up to 1 ton and distances up to 50 miles were used occasionally. Quarry blasts of 80 and 600 tons, respectively, have been observed at sea.

2. An underground blast deep enough to prevent escape of radioactive debris could be shallow enough to throw rock and dust into the air, cause building damage, or other similar effects in the immediate vicinity. I can think of nothing but seismic waves that would be propagated to great distances from an underground blast.

3 to 12. All of these questions require familiarity with seismic records of both earthquakes and of blasts of much greater size and distance than I have studied. Other seismologists are better qualified by personal experience to make a judgment on these questions than I. However, I would like to make the general comment that detection prediction is certain to be inaccurate, for it depends on many unknown factors which vary widely from place to place and from time to time. The maximum distance at which an explosion is detected depends not only on the size of the charge. It depends on the fraction of energy radiated as seismic waves, on the propagation of the waves to the receiver and on the local interfering disturbances. Each of these categories will change with locality, and the background disturbance will vary with time as well. Furthermore, in many areas

the background noise is man-made and controllable. It is not inconceivable that tests could be concealed by deliberate disturbances created near the receiving stations.

13. A nuclear explosion is more easily detected underwater than underground, first because a greater fraction of explosive energy goes into seismic waves and second, the very good propagation of sound through water gives an additional means of detection.

14. In 10 years of marine seismic exploration, I have studied several thousands of seismograms from underwater explosions. Most of these have been received with underwater detectors in the course of our geophysical exploration of the deep sea. In a few cases our underwater shots have been received on land stations as well.

15 and 16. The answers to these questions depend on the answers to questions 3 to 12, and my opinion is unimportant for the reasons stated above. However, from the little I know of the Rainier test, I think that with present methods the detection range for inspection purposes is hundreds rather than thousands of miles. This would require the order of 1 to 10 stations per million square miles of inspected area. As the combined area of U. S. S. R. and China is about 12 million square miles, roughly 100 stations, evenly distributed, would be required. The effectiveness of this system could be learned only through use, and as the testing of nuclear bombs presumably will have ceased prior to the setting up of the network, it might be difficult to ascertain the safe minimum number of stations required. In any case, it would be desirable to gain some experience with widely spaced stations before final choice of the ultimate number is made.

17. I believe that an underground explosion of sufficient magnitude to be detected by the seismic system could be located and identified by an inspection team sent to the locality defined by the system. The error in locating the site may be a few miles. Hence, the area to be searched might be about 10 square miles. It would be very difficult to dig the shaft or tunnel required and set up the necessary test facilities without leaving evidence detectable by an alert inspection team having free access to the area. The explosion itself should have some surface effects, unless it is several thousand feet deep, in which case the excavation would be even more difficult to conceal. Of course, this belief cannot enjoy complete confidence, for it is possible that concealment could be successful with sufficiently clever effort. However, the probability of detection would be so great that it is virtually certain that no country wishing to conceal secret tests would permit either the seismic system or inspection teams.

18. There is no way to carry out an underground nuclear explosion without high risk of detection by the system unless it is less than 1 kiloton, for by definition the system asked for in questions 15 to 17 is to be adequate to detect tests greater than 1 kiloton. The difficulty lies in deciding how many stations are necessary. If the station spacing is large, so that the detection of a Rainier-type test is marginal, then it may be possible to surround the bomb with absorbing material to decrease the seismic waves. However, I believe the Rainier test itself was made in material likely to have a strong absorbing effect. If I had this problem, I would attempt to find localities or site treatments that would reduce the intensity of the seismic waves at the source.

19. I think it impossible to obtain positive proof of a nuclear explosion from distant seismic waves alone. However, there would be a strong inference that it would be nuclear if it were much larger than 4 kilotons, as this is the largest known manmade chemical explosion. Positive proof of the nature of the explosion would require samples at the site. If it is found that the explosion is deeply underground, drilling at the site would be needed for identification, but it is hard for me to imagine anyone loading even as much as 10 kilotons of chemical explosive into a deep underground site. I know of no reason for doing this.

Sincerely yours,

RUSSELL W. RAITT.

Reply of Dr. Charles F. Richter, Professor of Seismology, California Institute of Technology

CALIFORNIA INSTITUTE OF TECHNOLOGY,
DIVISION OF THE GEOLOGICAL SCIENCES,
SEISMOLOGICAL LABORATORY,
Pasadena, Calif., April 18, 1958.

Hon. HUBERT H. HUMPHREY,
Committee on Foreign Relations,
United States Senate,
Washington, D. C.

MY DEAR SENATOR HUMPHREY: Enclosed on separate sheets are my replies to your questionnaire on seismic detection of underground explosions.

Since I believe that none of the material used is now classified, I see no reason why these replies should not be published. I have chosen the wording accordingly.

I have tried to indicate where I am drawing on material with which I have special familiarity, and also where my sources of information are secondhand or incomplete.

I appreciate the opportunity to contribute to this discussion.

Sincerely yours,

C. F. RICHTER,
Professor of Seismology.

REPLIES TO QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS

1. I have examined seismograms from the underground explosion, Rainier, written in southern California, and have compared them with those produced by natural earthquakes.

2. No.

3. Assuming use of the most sensitive instruments at locations remote from sources of disturbance (such as traffic, heavy machinery, ocean waves, running water, etc.):

1 kiloton: 700 miles or more.
10 kilotons: 5,000 miles or more.
100 kilotons: anywhere.

4. Distances for epicenter location are the same as for detection, provided that usable records are written at several stations in different

directions from the source. Stations over 7,000 miles distant would be of relatively little use, even though recording the shock waves.

Time of occurrence can be determined with error not likely to exceed 2 seconds.

Location should be good within 7 miles, using stations not over 1,000 miles distant; within 15 miles, using only more remote stations.

5. I understand that such diagnosis is possible, but do not have detailed information necessary to judge of its relation to distance. Any such evidence would be more convincing if found on seismograms at several stations than if dependent on one station only.

Study of differences between times of recording at near and at very distant stations could furnish evidence that the source was at or near the surface of the earth.

6. Three stations in different directions are absolutely necessary. In most cases at least 10 would be needed.

7. Identification does not depend primarily on number of stations, but will be more positive with more records; see answer to 5. I lack information adequate to estimate the percentages asked for.

8. The meaning is not clear. I hesitate to attempt an answer, because of possible misunderstandings. Obviously the more stations the better.

9. Determination would have high probability in the four following cases:

(*a*) An apparent earthquake originating outside the known seismic regions, which cover only a small part of the earth's surface. (Reference: Seismicity of the Earth, by Gutenberg and Richter.)

(*b*) Repetition from the same source at the same time of day.

(*c*) Evidence from recorded times indicating a source near the surface of the earth (see question 5). Natural earthquakes mostly originate at depths of 10 miles or more.

(*d*) Evidence of the diagnostic type not known to me in detail, referred to in question 5. I understand that some such evidence depends on the short duration of the blast as compared with a natural earthquake, resulting in certain rapid recorded vibrations characteristic of explosions. Such evidence at several stations would be conclusive.

10. If there is an affirmative answer, it must depend on the extremely short duration of the nuclear explosion as compared to others.

11. Yes. Also by conditions near the place of installation.

12. As the originator of the magnitude scale, I must point out that it was not devised to apply to explosions at or near the surface, but to natural earthquakes originating at depths of 10 miles or more. Assignment of magnitude to an explosion has two possible meanings:

(*a*) The explosion produces deflection on a seismograph at a given distance from the source, equal to that produced by an earthquake of the named magnitude at a station equally distant from its epicenter. This is the significance of the magnitude 4.25 quoted in connection with the Rainier explosion. (Note that 4.25 should be read as 4¼. Magnitudes are not assigned to hundredths.)

(*b*) A magnitude figure may be obtained by comparing the energy of explosion with that calculated for an earthquake of given magnitude. This method is unreliable, owing to present uncertainties in the calculation of earthquake energy.

Statistics requested involve difficult estimation. I have used data from Seismicity of the Earth and from recent Russian publications. Statistics for magnitude 6 and over are fairly complete; but for lower magnitudes they are fragmentary. Many earthquakes of magnitude as low as 4.25 probably escape attention. Some are not reported by the stations which record them. Others, while reported, are recorded so imperfectly that their location is doubtful.

In giving average annual statistics it is necessary to exclude the numerous aftershocks of large earthquakes. An earthquake of magnitude 7½ or over is likely to be followed by 100 or more aftershocks of magnitude over 4.25 within a year. Excluding such occurrences, I would estimate, for magnitudes 4.25 to 6 inclusive:

	Annually
U. S. S. R., excluding Kamchatka and Kurile Islands	25
Kamchatka and Kurile Islands	200
China	20

For magnitudes over 6.0, records since about 1903 indicate:

	Annually
U. S. S. R., excluding Kamchatka and Kurile Islands	3
Kamchatka and Kurile Islands	20
China	1 or 2

I estimate that it should take an explosion of 500 to 1,000 kilotons to write seismograms comparable with those of an earthquake of magnitude 6.

13. The underwater explosions at Bikini in 1946 and off California in 1955 were more effective in transmitting energy into the earth than the Rainier underground explosion. The one off California was recorded at very distant stations.

14. I have examined seismograms written in southern California on the occasions named under 13.

15. Seismic stations should be spaced not over 500 miles apart in critical areas, particularly where natural earthquakes are frequent. Personnel should include 1 regular attendant at each station, plus maintenance crews operating out of bases serving 5 to 7 stations each. Rapid communications should be provided to correlate recordings for all stations at an international headquarters. With efficient operation, detection should gradually improve to nearly 100 percent, as a result of identifying persistent earthquake sources and becoming familiar with their characteristics.

Highly sensitive seismometers, of both high-frequency and low-frequency characteristics, should be installed at each station.

Possibility of identifying nuclear explosions as such depends on the proper answer to question 10. Note, however, that there should be no obstacle to obtaining information on nonnuclear explosions.

I am not familiar with present costs. However large the program, its cost should be much less than that of continuing bomb tests.

16. This is not clear. How many times a year do you assume that someone will try to conceal a test?

17. This involves techniques with which I am not familiar. Inspection organizations should use normal police and detective procedures as well as scientific instruments.

18. I would (1) select an area in which natural earthquakes are frequent, (2) set up a seismograph and try to fire just after a large earthquake, (3) choose a season of heavy storms, (4) make the explo-

sion as small as possible. A further possibility would be to fire a large and announced nonnuclear explosion within 50 miles and about 2 seconds earlier. I would consider flying personnel and equipment to some remote part of the world.

19. The methods suggested under 18 would be still more effective in the absence of inspection.

I do not believe an explosion as large as 1,000 kilotons could be concealed deliberately. An explosion at the 10 kiloton level could be concealed by a distant earthquake, or among the aftershocks of a large local earthquake. Concealing explosions of 50 to 100 kilotons would partly depend on luck, and the necessary preparations would probably not be undertaken.

I am not sure whether or not an underground nuclear explosion could be identified as such from the records of distant stations only.

CHARLES F. RICHTER,
Professor of Seismology, California Institute of Technology.

Reply of Dr. Carl F. Romney, Geophysicist, Former Chief Seismologist, Geotechnical Corp., Dallas, Tex.

BETHESDA, MD., *May 16, 1958.*

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Committee on Foreign Relations,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: Enclosed is my answer to your questionnaire on seismic detection of underground explosions.

I have tried to answer each question, although in a number of instances there is not sufficient information available to give an answer which can be defended on a purely scientific basis. Four areas appear to be particularly uncertain to me. These are:

(*a*) *Detectability of blasts larger than Rainier (1.7 kilotons).*—While the amplitudes of earth motion produced by Rainier are fairly well known, there does not appear to be a well-established theory by which to scale up from 1.7 kilotons to 10 kilotons, or larger.

(*b*) *Dependence of seismic wave amplitudes on material surrounding an explosion.*—There are no established relations to use in estimating the size of seismic waves from a Rainier-type bomb exploded in granite, salt, or material other than tuff.

(*c*) *Methods for discriminating between earthquakes and blasts.*—As a result of an intensive study of the seismic waves from Rainier, I have concluded that the best means for differentiating between shallow earthquakes and underground blasts is through an analysis of the first motion in the P waves. If the theory is accepted that earthquakes are caused by faulting, then the first motion should be rarefactional at some locations in the case of earthquakes, but compressional at all locations in the case of blasts. The theory mentioned is by no means established to be true for all earthquakes and particularly not for small earthquakes. In any case, the absence of initial rarefactions is not proof of a blast because the area of the earth where the

rarefactions could be observed may be confined to a small region near the shock or may be water-covered or otherwise inaccessible. A seismic inspection system could thus identify many, if not most, earthquakes but there would remain a number which are totally unidentified. I believe that an unfortunate fact, with which all seismologists will agree, is that most characteristics of seismic waves depend chiefly on the structural and elastic properties of the earth rather than on the properties of the source. While it is possible that new and presently unknown differences will be observed in the case of underground explosions larger than Rainier, I am aware of no proof for these possibilities. It must also be evident that, if 1 kiloton is a realistic goal for an inspection system, the chief problem lies in the evaluation of small shocks rather than large shocks because of the rapid increase in total number as the size decreases.

(*d*) *Statistics on small shocks in the U. S. S. R. and China.*—For my own estimate, I have used Gutenberg and Richter's statistics for "class A" shallow shocks and assumed that smaller shocks in the U. S. S. R. and China are in the same proportion as in the world as a whole. Russian publications on seismicity do not indicate such large numbers, but are probably not complete since they include only located earthquakes and the Russian system of seismograph stations is least dense in the most active area near Kamchatka and the Kurile Islands. All estimates are subject to wide variations from year to year, and my belief is that a realistic inspection system must be prepared for a time of high seismic activity rather than "average" activity if the desire is to prevent weapons development.

The only way I can suggest to settle the first three of these problems is to conduct a series of underground nuclear explosions. After such tests, seismologists will be much more unanimous in their views than will appear in the set of divergent answers to this questionnaire which I feel confident will result from the individual seismologist's evaluation of the small amount of positive information available at the present time.

Sincerely yours,

CARL F. ROMNEY,
Geophysicist.

1. I have personally studied seismograms from numerous earthquakes and the following underground explosions:

(*a*) Seismograms from 38 stations on the Rainier underground explosion.

(*b*) Seismograms from 4 stations on each of the 3 blasts near Great Salt Lake, ranging from approximately one-fourth to 0.85 kiloton.

(*c*) In association with the United States Coast and Geodetic Survey, seismograms from numerous United States nuclear blasts at Eniwetok and Nevada.

2. No, although acoustic waves might be detectable at very small distances.

3. The detectability for a shot in the 1-kiloton class is rather well known as a result of the Rainier explosion. Detectability of larger

shots is much more speculative since seismic scaling laws are not well known. Following is my best estimate.

Yield	Detectable distance of P waves (degrees of arc)	
	Average station	Exceptionally quiet station
1 kiloton	6	[1] 8
10 kilotons	[1] 10	[1] 13
100 kilotons	95	95

[1] Also detectable in zone between 19° and 33°.

Shear waves will also be detectable to distances of the order of 15° but will not generally be useful for diagnostic purposes.

4. P waves detected in 3 above would be of sufficient quality to permit an accurate epicentral determination. Assuming detection at many stations surrounding the source, the epicenter would be located within 5 miles if stations were at distances less than 1,000 miles, and within 10 miles if stations were more distant. The times would be accurate within 1 to 2 seconds.

5. Under conditions similar to those of the Rainier blast, the seismograms from a 1 kiloton shot would have diagnostic information aiding in distinguishing from an earthquake to a distance of approximately 200 nautical miles for an average station location. A 10-kiloton shot should have similar information at a distance of about 400 nautical miles. A 100-kiloton shot should contain this information at all distances except perhaps in the range between 800 and 1,100 miles.

6. Ordinarily, at least 4 stations are required for an epicenter determination; however, at small distances, 3 stations will suffice if their azimuthal distribution with respect to the epicenter is satisfactory. The precision is lower than that given in answer 4.

7. No.

8. Four or five stations might suffice to identify perhaps 90 percent of earthquakes as due to natural causes. Seismograms from Rainier have disproved the common expectation that small underground explosions can be distinguished from earthquakes. In particular, it has been stated that pressure waves will predominate from an explosion whereas the shear waves will be greatly reduced compared to those from earthquakes. This is contrary to the actual Rainier observations. There remain some possibilities that major explosions will produce features identifying them as blasts. These possibilities are in the realm of speculation at the present time, since such blasts have not knowingly been observed by Western seismologists.

9. Underground explosions larger than 10 kilotons under Rainier conditions should produce initial compressions at all observing stations which record strong signals. This would imply, with a high degree of probability, that the event was an explosion rather than an earthquake; it would not be unambiguous proof, however.

10. For the reasons mentioned in 9 above, an underground explosion in the 100-kiloton class would be interpreted with a high degree of probability as a nuclear explosion because of the impracticability of producing such an event by chemical explosives; this

would not be unambiguous proof since the event would not be definitely established even as an explosion.

11. The depth of the explosion would profoundly influence the first motion, which is a primary means of distinguishing natural earthquakes. If the explosion was at a sufficiently shallow depth, the reflections from the free surface above could arrive at a distant station almost simultaneously with the direct wave; since the reflection would be reversed in phase, it could produce interference which would make the determination of the direction of the first motion extremely difficult. Some seismologists believe that surface waves might be used to distinguish between earthquakes and explosions. The depth can reasonably be expected to influence the generation and spectrum of surface waves from such an explosion. There seems to be no reason to doubt that the amplitudes of seismic waves can be reduced considerably under those generated by the Rainier explosion simply by firing in a medium having a lower yield point than the tuff which surrounded the Rainer shot. This would result in considerably more energy expended in inelastic processes near the source, consequently allowing less elastic energy to escape.

12. Preliminary estimates from seismograms from a few stations indicated that the Rainier shot was equivalent to a magnitude of 4.6. This has since been corrected to a magnitude of 4.25. Gutenberg has estimated in the Quarterly Journal of the Geological Society of London, volume 62, that 6,200 earthquakes per year occur between magnitudes 4.3 and 6.1. Since approximately one-sixth of the world's major earthquakes occur in the U. S. S. R. and China and nearby oceanic areas under the control of the Communists. I estimate there would be about 1,000 events per year in the magnitude 4¼ to 6 range which an inspection system would have to deal with. This estimate includes aftershock sequences of large quakes. Similarly, approximately 15 events per year occur in the same areas for magnitudes of 6.2 and greater. In this connection, it is of interest to note that more than 400 earthquakes of magnitude greater than 6 have occurred in the Kamchatka area alone since 1952. Since scaling laws for large explosions have not been established experimentally, it is very difficult to estimate the size of a blast necessary to produce a shock equivalent to a magnitude 6 earthquake. However, assuming the same fraction of energy goes into the ground as was estimated from the magnitude determination on Rainier (one two-hundredth of the total energy), Gutenberg's estimate of the relation between magnitude and energy would imply that a megaton shot is required to produce a magnitude 6 earthquake. However, some information from conventional high explosives suggests that this estimate may be too pessimistic and that a 40-kiloton exposion will suffice to produce a magnitude 6 shock.

13. Water appears to be a very effective medium for tamping explosions, according to experience with small chemical explosions. It is probably more effective than most earth materials, although there are no cases known of an underwater and an underground explosion of equivalent yield, so that there are no direct comparisons for nuclear-size blasts.

14. I have studied United States Coast and Geodetic Survey and university seismograms from many stations in the case of the Wigwam underwater explosion and seismograms from a few stations from the Bikini/Baker underwater explosion.

15. For detecting tests in the Soviet Union and China, approximately 50 stations would be required. These would be most densely distributed in seismic areas, since any shock originating in seismic regions would be immediately suspected of being manmade. Each station would require 2 to 12 technicians, depending chiefly on how rapidly the results are required at a central analysis center. The analysis center, in turn, would require approximately two men per field station.

The extension of the system to include the entire world is not feasible for detecting 1-kiloton tests, because of the vast regions of the earth which are covered by water and are, therefore, unsuitable for seismographic stations. The existing network of seismographic stations, both within and without the U. S. S. R. would be of assistance in this connection, but many additional stations would certainly be required, chiefly in the Southern Hemisphere.

Of the order of 90 percent of the earthquakes occurring in Communist-controlled territory could be identified by such a system. In other parts of the world, a much smaller percentage would be identified and it seems probable that most shocks smaller than the equivalent of 10 kilotons would be unidentified.

With the network proposed, there is a 10 to 20 percent chance that an explosion might be incorrectly identified as an earthquake. The evidence for this is chiefly the seismograms from Rainier, where it was found that a number of stations more distant than 250 miles recorded first motions which would probably be interpreted as rarefactions, leading to the earthquake interpretation.

Approximately 2 years would be required to install such a system even if the program was given the highest priority. I would recommend that each station be equipped with 3-component long-period seismographs and arrays of perhaps 20 short-period vertical seismographs. A crude estimate of the cost would be $50,000 per station for technical equipment alone. This system would not identify an underground explosion as a nuclear explosion independently of other forms of intelligence.

16. The system described might have a reliability of 95 percent in identifying as natural earthquakes those shocks having energy greater than 10 kilotons. Unfortunately, most of the shocks would be of smaller size, equivalent to 1 to 5 kilotons. Since the reliability is a direct function of the signal size most small shocks would be less easily identified. My estimate is that, in Communist-controlled territory, as many as 300 shocks per year would remain unresolved if shocks as small as 1 kiloton equivalent were considered. Outside of Communist territory, the number would be vastly larger—perhaps many thousands per year.

17. I have no competence in this area. My belief is that a sample of fresh nuclear fission products is the only proof.

18. Several possibilities are suggested. I am not able to evaluate their respective merits in detail.

(*a*) Fire in a well drilled deep under the bottom of a shallow sea. Even if the event was suspected from seismic evidence to be an explosion, it seems exceedingly unlikely that nuclear proof could be produced by inspection teams.

(*b*) Fire in thick ice in Antarctica. Since ice is a very poor transmitter of seismic energy, it is doubtful that a blast as large as 10

kilotons would even be noticed. The net effect would probably be to melt 120,000 cubic meters of ice (a 50-meter cube).

(*c*) Fire in a dry volcanic tuff. There is no reason to believe that coupling of seismic energy to the earth cannot be reduced to at least an order of magnitude below the Rainier coupling.

19. In the absence of an inspection system, tests could be concealed by firing in any seismic area. To the best of my knowledge, there is no proof of any nuclear explosion except nuclear debris.

Reply of Dr. Louis B. Slichter, Director, Institute of Geophysics, University of California

UNIVERSITY OF CALIFORNIA,
INSTITUTE OF GEOPHYSICS,
Los Angeles, Calif., May 27, 1958.

Senator HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: Please pardon my delay in responding to your letters of April 16 and May 7 concerning the detection of underground blasts. It was my thought that you would obtain the most informative and authentic testimony from the relatively few experts who have long been devoting almost full time to the study of the important questions you raised in your excellent questionnaire. Thus, rather than dilute the record with evidence which I would consider less trustworthy than the best, I refrained from submitting my opinions.

I would expect that the smaller explosions would be very difficult to distinguish from a minor earthquake. But, in the end, I would expect a modern program, well instrumented with suitable seismographs, and employing the best means of analyzing the records, to succeed in detecting almost all the large blasts—say 90 percent, or more, of these.

Sincerely yours,

LOUIS B. SLICHTER,
Director.

Reply of Don Tocher, Seismologist, University of California

UNIVERSITY OF CALIFORNIA,
SEISMOGRAPHIC STATION,
Berkeley, Calif., April 17, 1958.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Committee on Foreign Relations,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: Complete answers to all questions in your Questionnaire on Seismic Detection of Underground Explosions would involve considerable research and information from sources not readily available to me, and, to a certain extent, not available to me at all. Consequently, I shall attempt to summarize below my knowledge on our technical ability to detect atomic explosions, based on my

own experience studying the seismograms of the University of California network of stations.

Records of the Rainier underground test written at the University of California stations had no characteristics which, to me, would have suggested anything other than an earthquake. Our closest stations, at Reno and Fresno, are about 200 miles from the test site.

Information on the occurrence of other test explosions in southern Nevada usually has been available only from the newspapers. A few of the aboveground Nevada shots produced shock waves through the air large enough to record on our seismograms. The speed of sound in air is much lower than in the rocks, so that the very late arrival of the sound wave is a good clue that an explosion has occurred. Doubtless a recording microbarograph would have detected air waves from many other aboveground shots from which seismographs did not.

The underwater atomic explosion fired off the coast of Lower California on May 12, 1955, wrote a unique series of records on the University of California seismograms. Transmission of energy in the sofar layer of the ocean was so strong that several persons along the coast of California reported feeling an "earthquake." (At Big Sur, Santa Cruz, and at sea off the Golden Gate.)

To summarize, underwater and above-ground atomic explosions would produce seismograms and/or microbarograms at stations 200 or more miles away which could, in all probability, be recognized for what they were. Records at a station 200 miles from an underground explosion most likely would be indistinguishable from records of an earthquake at the same distance. Occurrence of an "earthquake" in a region of low seismicity might raise suspicions that the source was an explosion, but confirmation would have to come by methods other than seismic.

Very sincerely,

DON TOCHER.

Reply of Dr. M. A. Tuve, Director, Department of Terrestrial Magnetism, Carnegie Institution of Washington

CARNEGIE INSTITUTION OF WASHINGTON,
DEPARTMENT OF TERRESTRIAL MAGNETISM,
Washington, D. C., May 15, 1958.

Hon. HUBERT H. HUMPHREY,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: I have your note of May 7 concerning the extensive questionnaire you sent me on April 9.

I am in full sympathy with your efforts to collect sound scientific information concerning the possibility of detecting atomic explosions, as a basis for ultimate agreement on stopping the atomic tests. It is my present conviction that the United States has more to gain by negotiating such an agreement than by continuing with the refinement of our weaponry.

Nevertheless, I do not undertake to give answers to the extensive questionnaire dated April 8 which you submitted. Many or most of these questions could only be answered after extensive measurements made by a rather large group of investigators specifically for the purpose of ascertaining the magnitudes and limits involved in the

seismological detection of explosions. This has been the straightforward obligation and duty of our own Government, and it is a sorry comment on the recalcitrance of the Atomic Energy Commission for information of this kind to be obtained in an unbiased way only from investigators having no connection with Government activities.

We have never undertaken to observe any nuclear explosions. Our Carnegie equipment is for field use only, and does not record continuously. I might say that we observed TVA explosions during the period 1947–49 at distances of 1,400 and even 2,000 kilometers. The charges were of the order of 500 to 800 tons of ordinary explosives. We observed the Ripple Rock blast from Vancouver Sound a month ago, at a distance of 3,800 kilometers. I believe that a modest array of inspection stations in each country would permit the detection of all explosions larger than 500 or 800 tons TNT equivalent, but that the identification as specifically a nuclear blast, especially if underground, might require access to the suspected region.

Very truly yours,

M. A. TUVE, *Director.*

Reply of Dr. Edward J. Walter, Acting Director, John Carroll University

JOHN CARROLL UNIVERSITY,
SEISMOLOGICAL OBSERVATORY,
Cleveland, Ohio, April 25, 1958.

SENATOR HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: Enclosed are the answers to your questionnaire on Seismic Detection of Underground Explosions. The basic question is a complex one in which only a limited experience is available.

I have attempted to extrapolate my experience in related fields to supply answers to the questions. I hope that the information is of service to you.

Sincerely yours,

EDWARD J. WALTER,
Acting Director.

GENERAL REMARKS CONCERNING QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS

The question of seismic detection of nuclear explosions is very pertinent, but a rather complex question. At first thought, it might seem that the tremendous energy release of such an explosion would be an ideal seismic generator. By far the largest portion of the energy is not used to generate seismic waves. In addition to this, the seismic wave pattern does not seem to be the same as that occurring in natural earthquakes. Some wave types, notably the shear waves and surface waves, are small or missing, while new types, such as the hydrodynamic, have been observed.

This represents a new seismic generation technique and the interpretation of the results will depend upon acquiring experience in

dealing with this new mechanism. To my knowledge, only one underground test, Test Rainier, has been conducted. This represents a very limited experience, if experience at all. Reports on the seismic results of this test to date have been fragmentary. Two papers were just presented at the annual meeting of the Seismological Society of America, held March 27 to 29 at the University of Oregon, and undoubtedly will soon be published.

Here at the John Carroll University Seismological Observatory, none of the tests in the Pacific area were recorded. Test Rainier gave a minimal recording of the surface waves only at John Carroll. Our recording situation might be termed average with regard to noise level background and, hence, permissible instrumental magnification. The distance from the John Carroll Seismological Observatory to the Test Rainier site is approximately 1,850 miles. With this limited experience, it is difficult to give precise answers to the many points in the questionnaire.

ANSWERS TO QUESTIONNAIRE ON SEISMIC DETECTION OF UNDERGROUND EXPLOSIONS

1. My experience in this regard has been fairly extensive but quite varied. When considering earthquake seismograms which show recordings of underground explosions, my experience is limited but comparable to that of the average seismologist.

2. For detection at great distances, no. For detection by examination of the blast area, a number of methods might be used such as core drilling, measurement thermal gradients, seismic profiling, gravity profiling, electrical profiling, and physical, chemical, petrographic analysis of core samples.

3. This question is quite involved. Instrumental sensitivity, noise level background at the point of observation, and efficiency of such explosions as seismic wave generators are but some of the major factors entering the picture. Assuming good operating conditions, that is high sensitivity instrument with a quiet noise background such as in the Canadian shield area, fair seismic detection should occur as follows:

	Miles
1 kiloton	1,000
10 kilotons	1,500
100 kilotons	2,000

4. Under the conditions of item 3 and assuming good recording of seismic wave types, records within the distances cited should yield an epicentral determination. Origin time could probably be estimated to plus or minus one-tenth of a minute and location within ±100 miles.

5. Generally speaking, the closer to the source, the more diagnostic the recording.

6. Three.

7. (*a*) Possibly.

(*b*) Features that would render possible the distinction are smallness or lack of shear waves and surface waves and/or the presence of the hydrodynamic wave type at short distances.

(*c*) I could only guess as to the percentage of successful identifications. Assuming good recording and a backlog of experience which is

presently lacking among seismologists, 90 percent would seem a likely goal.

8. (*a*) The more the better.

(*b*) Same as 7c.

9. (*a*) Quite possibly.

(*b*) Under the circumstances of a well-recorded event at a number of stations.

10. Seismic evidence could tell us that an underground explosion had occurred but when we inquire particularly if it is a nuclear explosion as distinct from some other types of explosions, it is more difficult to say. There may be specific indentifying seismic characteristics in a nuclear explosion which experience will bring out.

11. Not significantly.

12. (*a*) Possibly 50.

(*b*) Possibly 15.

(*c*) Approximately 2 megatons.

13. I am not aware that this is so.

14. I have not studied such seismograms.

15. (*a*) A relatively closely spaced network of seismic stations through the areas under surveillance based on a grid system of 250 miles per unit grid should be able to record and detect underground explosions. If we assume that locations could not be made inside Russia and Russian-controlled areas, seismic stations should be established in the adjacent seismically stable areas such as North Africa, Arabia, India, Malay Peninsula, Greenland, Arctic region north of Europe, in addition to stations throughout the rest of the free world.

(*b*) This might require as many as 100 seismic stations.

(*c*) See 7 (*c*).

(*d*) See 7 (*c*).

(*e*) Possibly 1 year to 2 years.

(*f*) High sensitivity instruments of the Benioff type, both long and short period, horizontal and vertical components.

(*g*) From $5 million upward. This does not include operation and maintenance.

(*h*) Very doubtful.

16. See 7 (*c*).

17. (*a*) Successful seismic detection by such a closely spaced network should pinpoint the epicentral location much more closely than specified in the answer to question 4 which assumes teleseismic recording or recording at a great distance. Under the conditions of this closely spaced seismic network, the location should be within ± 10 miles and the time ± 1 second. If all surface evidence in the epicentral region examined by the inspection team were negative, then various devices and techniques such as seismic profiling, gravity profiling, electrical methods, measurement thermal gradients, core drilling, and radiation testing of core samples could be employed in this relatively small epicentral region.

(*b*) Such direct sampling as core drilling and radiation analysis of cores, and petrographic, physical, and chemical analysis of rock samples would definitely identify nuclear testing.

(*c*) An area of approximately 10 by 10 miles.

(*d*) Surface effects, such as fracturing of ground surface, radiation effects, comparative tests of rock samples, petrographically, physically, and chemically.

18. (*a*) Limit the test size.

(*b*) Conduct test at deepest possible depth. Depth could have a considerable effect on small-size testing.

(*c*) If possible, bury the explosive device beneath a thick geologic sill type intrusion so that all effects would be held beneath this cover.

19. (*a*) (i) Carry out tests in seismic areas so as to make the interpretation problem as complex as possible.

(ii) Change location frequently.

(iii) Limit size of test.

(iv) Conduct test at depth.

(*b*) 10 kilotons, possibly; 50 kilotons, not likely; 100 kilotons, not likely; 1,000 kilotons, very unlikely.

Reply of Prof. James T. Wilson, Department of Geology, University of Michigan

UNIVERSITY OF MICHIGAN,
DEPARTMENT OF GEOLOGY,
Ann Arbor, April 29, 1958.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Committee on Foreign Relations, United States Senate,
Washington, D. C.

DEAR SENATOR HUMPHREY: This is in reply to your letter of April 9 enclosing a questionnaire on seismic detection of underground explosions. Below I have answered all of those questions to which I think I can give pertinent answers. For a number of them I am in no position to give helpful information, and for others I can only indicate vague possibilities. In answering the questions, I am assuming that from the nature of the questionnaire you have a staff well aware of many of the scientific problems.

(1) I have examined a good many seismograms from quarry blasts and other similar underground explosions. My graduate students have recently successfully recorded the large Ripple Rock explosion north of Vancouver, and we obtained some interesting but controversial records of the Rainier underground nuclear test last year.

(2) No suggestions.

(3) In answering this question, I would like to make reference to a publication of the Geophysics Research Directorate, Air Force Cambridge Research Center, Air Research and Development Command, Publication No. 87 in their series, Air Force Surveys in Geophysics entitled "An Estimate of the Maximum Range of Detectability of Seismic Signals," by N. A. Haskell, March 1957, ASTIA No. AD–117198. This report indicates that an underground explosion with an equivalent yield of 1 kiloton might be recorded at distances as great as 700 miles. With a yield of 10 kilotons the distance might be as much as 1,300 miles, and of 100 kilotons perhaps as much as 2,300 miles. In the light of present knowledge, I think these estimates are quite realistic. Knowing in advance that such an underground explosion was to occur and knowing the approximate time at which it was expected, these distances might be extended somewhat.

(4) For a determination of the epicenter, the distances given in question 3 would have to be reduced to half or less. The accuracy

of the time and location determinations would then depend primarily on the distribution of the recording stations.

(5) I have no information that bears on this question. This does not mean that an intensive study of this subject might not furnish some information that could lead to an answer.

(6) Theoretically 3, but in practice, at least 5.

(7) See the answer to question 5.

(8) See the answer to question 7.

(9) Not for the present state of the art. See answer to question 5.

(10) No. See answer to question 9.

(11) If characteristics of the recordings of an underground explosion can be identified, that distinguish them from earthquakes, I doubt if the nature of the surrounding strata, et cetera, would camouflage the characteristics. Conceivably, other explosions set off at the same time might confuse the identification.

(12) A good many earthquakes of magnitude 4.25 to 6 occur in the U. S. S. R. and China. I will not attempt to make estimates as rather good information is probably available from others. As to the size of explosion that would be necessary to produce a magnitude 6 earthquake, I can only hazard a guess, but it would probably be on the order of 100 kilotons, which, of course, would be almost impossible to contain underground.

(13) I have no information bearing directly on this question, but I would suspect that it might be considerably easier.

(14) I have not studied such seismograms.

(15) I do not feel competent to answer this question with my present state of information. I would guess that it would take a rather large number of stations. From my answer to question 3 it is evident that a gridwork of stations on a spacing of not less than a few hundred miles would be necessary, which I would think would almost make such a system impractical. The personnel requirements of such a system would be enormous, and all the problems raised earlier of properly identifying earthquakes and explosions would exist. As I have indicated earlier, in the present state of the art I would doubt if any such system is now capable of identifying with certainty an underground explosion as a nuclear explosion.

(16) No information not given above.

(17) This is a question on which I have no specific information.

(18) Without having proposed a specific system in question 15, it is a little difficult for me to answer this question. I might point out that the Rainier blast might have passed almost unnoticed seismically in the United States had it been fired in, say, western Nebraska, northern North Dakota, or a number of other such places. This is despite the fact that the United States has quite a large number of seismograph stations. It would undoubtedly have been recorded but would have probably entered the historical file as a minor earthquake in an odd location.

(19) In the absence of a large number of seismic stations in the U. S. S. R. and China, I feel there is no doubt that a rather large nuclear test could be conducted in such a manner as to prevent our knowing that it had occurred. I think the main problem here is one of confinement. Without being an authority on the subject, I would be rather doubtful as to the practicability of trying to contain any explosion as large as 50 kilotons, and I think it might be economically

impractical to contain one as small as 10 kilotons. I think the chances of containing one as large as 1,000 kilotons are rather remote. If the explosion is not contained, I would assume that it would be detected by other means.

I am sorry that many of my answers seem vague and that I am not able to be more specific. As I am sure you realize, this is a very large problem and one on which only a moderate amount of work has been done, or at least is generally known to seismologists. Seismologists have had only limited opportunities to record large underground explosions, nuclear or otherwise, and most of those recordings that have been made have been with a view to determining crustal structure, travel times of the waves, et cetera, rather than to the problem of distinguishing between earthquakes and explosions. The main reason my answer to question 15 is so vague is that in the absence of a great deal of specific information on the characteristics of large underground explosions it is almost impossible to propose a realistic system. This is not to imply that sufficient research might not make such a system practical; however, I think it likely that sufficient research might show that such a system is completely impractical.

Despite the vagueness of my answers, please do not hesitate to call on me again if I can be of any help. I appreciate the seriousness of the problem, and for the past year or so, my graduate students and I have been engaged in research which bears very closely on this subject.

Sincerely,

JAMES T. WILSON.

UNIVERSITY OF MICHIGAN,
DEPARTMENT OF GEOLOGY,
Ann Arbor, Mich., May 14, 1958.

Hon. HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament,
Committee on Foreign Relations,
The United States Senate, Washington, D. C.

DEAR SENATOR HUMPHREY: This is in reply to your letter of May 6 acknowledging receipt of my answers on the questionnaire for the Subcommittee on Disarmament, and asking for some additional clarification.

With regard to my statement "* * * we obtained some interesting but controversial records of the Rainier underground nuclear test last year," I will elaborate a little further, particularly in view of the recent article in the New York Times. In common with many other seismologists in the United States, we made special efforts to record this blast. Along with our more or less orthodox equipment, we set up one of our "seismic level recorders." This is a device designed at our research center for recording the level of ground motion. By "level" is meant essentially a running average of the ground amplitudes. As used at the time of the Rainier shot, the level recorder was recording all ground frequencies between about three cycles per second and a hundred cycles per second. We obtained a far larger record than anticipated on this equipment. The record began at the time the first P wave was expected and there was another prominent arrival

within a few seconds of the time when S was expected. Because of this time coincidence, we feel that there is a very strong chance that what we recorded was the Rainier shot, even though the record is much larger than would be expected. Our normal equipment running at the same time and place had only a very low sensititivy for ground frequencies higher than about 10 cycles per second. From this and other data we are fairly sure that what we recorded on the level recorder was ground motion with a frequency higher than 35 cycles per second. This is outside of the frequency range normally recorded by seismograph observatories.

We have shown this record to a number of seismologists and discussed it with them, and most of them seem to share our skepticism; however, there is the very real possibility that these higher frequencies are generated not only in underground nuclear shots but very possibly in normal blasts or earthquakes. Consequently we finally decided that we had better present some of our results. Actually, we presented some of our results at a meeting of the American Acoustical Society last fall, but they did not at that time attract any great amount of interest.

We set up similar equipment at several places in the United States at the time of the big nonnuclear blast north of Vancouver last month. Our records from this blast were rather disappointing and at the present I feel that we neither verified nor disproved our results from the Rainier test.

I have emphasized to the press (and, of course, to my fellow seismologists from the beginning) that our rather startling results are from only one piece of equipment, at one time, and from one test. We can all think of quite a number of things that might have given us a spurious record. To be of much use, our results would certainly have to be verified from another test, and a specific search made for the higher frequencies we think we recorded. We are, of course, in the process now of looking for these higher frequencies in "natural" sources.

With regard to my statement about "might have passed almost unnoticed seismically in the United States," I merely meant that if the test had been made in any area of sparse population and where there are not a large number of seismograph stations, it would have attracted little or no attention and would have been written off as a small earthquake. Only in California and to a certain extent in northeastern United States are there enough seismograph stations to really locate a magnitude 4¼ earthquake. Earthquakes as large as magnitude 4 to 4½ are widely enough distributed that the occurrence of one of them almost anywhere in North America (in any part of the world, for that matter) would not be cause for any intensive seismic investigation, or at least would not have been in the pre-nuclear-test days.

If there is any further information I can give you, please do not hesitate to write me.

Sincerely,

JAMES T. WILSON.

Reply of Dr. J. Lamar Worzel, Assistant Director, Lamont Geological Observatory

COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK,
DEPARTMENT OF GEOLOGY,
LAMONT GEOLOGICAL OBSERVATORY,
Palisades, N. Y., May 13, 1958.

HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament, Committee on Foreign Relations, United States Senate, Washington, D. C.

DEAR SIR: Due to my absence in the field, I have been unable to answer your questionnaire on seismic detection of underground explosions sooner.

1. I have, personally, only studied seismograms of nuclear weapons superficially.
2. No.
3. This question is complicated, due to the varying absorption of layers at different locations. My estimates would be that a 1-kiloton could be detected about 500 miles, 10 kilotons could be detected about 3,000 miles, and 100 kilotons at any decent station.
4. Under conditions of (3) I believe epicenters could be located at about 400 miles for 1 kiloton, 2,000 miles for 10 kilotons, and from any first-class stations for 100 kilotons.
5. I do not feel qualified to answer this question.
6. The minimum number of stations to reliably determine the accurate epicenter would be five well-located stations.
7. I do not feel qualified.
8. I do not feel qualified.
9. Whenever the signal was substantially above noise level, it should be unambiguous whether there was an underground explosion. In other words, for the bigger bombs there should be no trouble.
10. Yes, provided there would be no doubt that conventional explosives were not used and the signal was substantially above noise level.
11. Yes; the identification is seriously impaired by reducing the signal to noise level, and these changes could reduce the signal level.
12. I know little of the seismicity of Russia or China, but, on the basis of similarities to other areas, I'll judge that there might be 100 to 200 magnitude 4.25 to 6 earthquakes in U. S. S. R. and, perhaps, 400 in China. Probably 30–40 magnitude 6 would be observed in the U. S. S. R.
13. It is, apparently, very much easier to detect a nuclear explosion underwater than underground as evidenced by the observations from Operation Wigwam. This shot was recorded by stations all over the world and contained waves not observed in earthquakes or underground explosions.
14. I have studied many hundreds of seismograms from underwater explosions.
15. I believe the estimates of people who have studied this problem more directly should be used. My estimates would be almost guesses at this time.
16. See (15).
17. See (15).
18. See (15).

19. In the absence of an inspection system, a test might be hidden by (1) firing in a highly seismic area; (2) firing just after a magnitude 5 or larger earthquake; (3) firing in thick spongy areas where high absorption could be expected; (4) firing at such a distance within their national boundaries that a meteor impact could not be denied by outside observers. I believe 10 kilotons could be hidden; 50 kilotons could be hidden some of the time; 1,000 kilotons could, probably, not be hidden.

Sincerely yours,

J. LAMAR WORZEL,
Assistant Director, Professor of Geophysics.

III. REPLIES OF SEISMOLOGISTS TO EACH QUESTION*

2. Can you suggest detection techniques other than seismic that would be useful in detecting underground nuclear tests placed deep enough to prevent the escape of radioactive debris?

BAILEY. Other detection techniques include high frequency acoustic wave detection for shallow buried nuclear test. Shock waves generated by the explosion of Rainier caused the surface to rise several inches. This causes a compressional wave to be generated in the atmosphere. This wave has a frequency so high that it would tend to be lost in ever present high frequency acoustic noise background except at distances of a few miles.

BEERS. With one possible exception, which may have been tested by an agency of the United States Government but not within my personal knowledge, the answer is "No."

BENIOFF. No answer.

CARDER. No. Possible exceptions are local ground to air acoustic waves.

DONN. I am not familiar with any other useful or proved technique for detecting deep explosions.

EVERNDEN. No answer.

EWING. No.

GUTENBERG. No.

HASKELL. No.

HEINRICH. At the present time, no.

HEROY. None, other than espionage.

HOWELL. No answer,

KNOPOFF. For completeness, we note that the energy of an underground nuclear explosion should be converted into seismic energy, into energy of deformation of matter in the vicinity of the source, and into heat. Surface detection of the last two features of an explosion are not practical. Any deformation of the surface can be made negligible by shooting sufficiently deeply. In the case of the liberated heat, the surficial heat flow would change but at times of the order of months or years after the shot and measurably so only at sites immediately adjacent to the epicenter. For small shots this effect may be negligible even at the epicenter. I can suggest no techniques other than seismic techniques for the rapid detection of underground explosions at unknown sites and times.

LEET. I know of no technique other than seismic that would offer any prospect for the successful detection of underground nuclear tests.

LEPP. I can think of no other technique that would detect an underground nuclear test at considerable distance from the explosion center.

LINEHAN. The study of telluric currents or seismo-electric effects might have some result, but I have not worked with these methods to state how accurate or sensitive these methods might be, Microbaro-

*Replies to questions 1 and 14, concerning individual experience pertinent to these questions, have not been included in this section. However, these answers may be found in the previous section which contains the full replies of all respondents.

grams have been used in studying uncovered explosions, but should not be too satisfactory for the buried shots,

LYNCH. This calls for further thought.

MURPHY. I know of no methods other than seismic for detecting underground nuclear explosions placed deep enough to prevent the escape of radioactive debris.

NUTTLI. I cannot suggest any technique other than seismic that would be useful in detecting underground nuclear tests placed deep enough to prevent the escape of radioactive matter.

OLIVER. No.

POULTER. I know of no technique other than seismic whereby an underground nuclear shot can be detected, and I seriously question whether it will be feasible to differentiate between earthquakes and underground nuclear shots except in very special cases. Not enough information is available to date on the type of records that would be obtained from underground nuclear shots to answer this with certainty.

A very careful study should be made of all seismic signals and the presence of meaningful air waves should be looked for on all future underground shots.

Air waves transmitted over distances of as much as 500 miles through the air from comparatively small explosive charges are currently being used to measure the direction and velocity of the wind at altitudes of between 50 and 100 miles. I see no reason why the sudden rise of the surface of the ground over a wide area on underground nuclear shot would not create such an air wave detectable by a microbarograph. I would like to see this carefully investigated on all future underground shots.

PRESS. No.

RAITT. An underground blast deep enough to prevent escape of radioactive debris could be shallow enough to throw rock and dust into the air, cause building damage, or other similar effects in the immediate vicinity. I can think of nothing but seismic waves that would be propagated to great distances from an underground blast.

RICHTER. No.

ROMNEY. No, although acoustic waves might be detectable at very small distances.

SLICHTER. No answer.

TOCHER. No answer.

TUVE. No answer.

WALTER. For detection at great distances, no. For detection by examination of the blast area, a number of methods might be used such as core drilling, measurement thermal gradients, seismic profiling, gravity profiling, electrical profiling, and physical, chemical, petrographic analysis of core samples.

WILSON. No suggestions.

WORZEL. No.

3. At what distances do you believe that an underground explosion occurring at an unknown time in an unknown place of equivalent yields of 1 kiloton, 10 kilotons, and 100 kilotons would be detected?

BAILEY. Assuming a very quiet station location, microseismic noise background normal for the station, no local or regional earthquake recording at the time of recording of the explosion, I would estimate

that a 1 kiloton buried device could be detected at distances up to about 500 miles, a 10 to 2,000 miles, or 100-kiloton buried device would be detected at any distance. With much noisier station locations, detection would become more difficult and the above distances would be drastically reduced. I am thinking here of the capabilities of short period Benioff variable reluctance vertical seismographs with seismometer period of 1 second and galvanometer period of 0.2 second.

BEERS. If the conditions prevail under which Rainier is reported to have been detected at 2,500 miles, the answer to this question would be 1 kiloton, 2,100 miles; 10 kilotons, 4,500 miles; 100 kilotons, 9,700 miles.

BENIOFF. No answer.

CARDER. If of Rainier type.

[In miles]

Shot size	Normal conditions	Quiet conditions
1 kiloton	300	600
10 kiloton	1,500	3,000
100 kiloton	3,500	[1] 6,500

[1] Also 8,500 to 12,500 miles.

DONN. An explosion of 1 kiloton should be detected up to 200 or 250 miles; 10 kilotons, about 500 to 1,000 miles; and 100 kilotons, over 2,000 miles. These figures are conservative estimates based on surface quarry blasts, which are inefficient in putting seismic energy into the ground. They are certainly minimum figures. Also, the geologic structure is quite important, for the seismic energy will lose considerably in crossing mountain ranges, etc.

EVERNDEN. I would say that the maximum distance for effective observation of a 1-kiloton explosion would be 400 kilometers and that it would be highly desirable to have stations within 250 kilometers of the epicenter. Effective observation of a 100-kiloton shot should be possible at 4,500 kilometers, with 2,500 kilometers being desirable.

EWING. See the reply of Dr. Jack Oliver.

GUTENBERG. The distance at which an underground explosion can be detected depends very much on the material in which the explosion occurs. In dry, porous material underground, much more energy is absorbed than in solid rock or in water, including ground water. Moreover, the distance depends very much on meteorological conditions. On days with small microseisms the record of an explosion can be detected and used at distances appreciably greater than on days when the microseisms (mostly connected with high ocean waves or instable air) are large.

HASKELL. Detection ranges may vary widely depending upon geological environment at shot point and along the path of propagation and the seismic noise level at the detection site. I would estimate that 90 percent of all cases would fall between the following limits.

	Miles
1 kiloton	850–1,700
10 kilotons	1,700–3,400
100 kilotons	3,200–6,500

HEINRICH. The distance from the explosion site at which an underground blast may be detected is a variable and depends on—

(*a*) Whether an interpretive or noninterpretive detection is desired.

(*b*) The site factors of the detonation: (i) size of charge; (ii) emplacement; (iii) rock character, structure, and stratification, (iv) type of detonation, etc.

(*c*) Factors influencing the propagation of the seismic waves along paths in various directions surrounding the blast site. Through or along mountain ranges, etc.

(*d*) Factors determined by the location of the recording station: rock, subfoundation, terrain, background noise, level of microseisms, etc.

(*e*) The type of instrumentation used for the recording.

(*f*) The experience of the analyst with this type of recording and the peculiarities of the individual station.

(*g*) Others.

Consideration of the above factors indicates the difficulty of giving a single value limit to the maximum distance at which detection of an unknown explosion would be detected from seismograph data alone.

From the data available to me, from ordinary news channels, it appears that only an examination of the individual records of stations at various distances and directions from the Rainier test (1.7 kilotons) would reveal these limits.

Interpretive records were obtained at distances of several hundred miles, while noninterpretive records were obtained at greater distances.

My own experience, with records of the Bristol, Tenn., blast of July 14, 1948 (TVA 840,000 pounds nitromon), suggests a value of 450 miles as the order of magnitude of distance for interpretive detection. Around this value there will be a range which will vary with the factors listed above. I have no basis for comparison of blasts of higher yield. While it might normally be expected that the distance would increase with the increase of charge, this may also serve in a decreasing manner by increasing the possibility of confusion with earthquakes for certain distance ranges.

I would need to conduct an analysis of items (*a*) to (*g*), above, to derive specific values and ranges.

HEROY.

Yield:	*Detectable distance (degrees of arc)*
1 kiloton	6° (possibly up to 25° depending on variations in the travel-time curve).
10 kilotons	90° (exceptionally quiet place).
100 kilotons	180°.

"Detected" is here interpreted as meaning "recorded and identified as an event by seismic methods."

HOWELL. The answer to this is a guess. Dean S. Carder of the United States Coast and Geodetic Survey can probably answer this question accurately. One kiloton could be detected at distances of a few tens to hundreds of miles; 10 kilotons perhaps at distances of 1,000 to 2,000 miles; 100 kilotons would be detectable perhaps as far as several thousand miles or more. The fact that they would be detected does not necessarily mean that they would be recognized as an explosion phenomenon rather than a natural earthquake.

KNOPOFF. Using the standard definition 1 kiloton$=4\times10^{19}$ ergs, and the old Gutenberg-Richter energy-magnitude relation

$$\log E = 12 + 1.8M$$

we see that the equivalent earthquake magnitudes of 1-kiloton, 10-kiloton, and 100-kiloton explosions would be 4.2, 4.8, and 5.3, respectively. In passing, we note that a 1.7-kiloton explosion would have a magnitude, according to this formula, of 4.35, a value close to the observed value for the Rainier explosion. Gutenberg and Richter (Seismicity of the Earth, 2d edition, Princeton, 1954, p. 10) state that shocks of magnitude below 5.3 are well recorded at stations less than 600 miles from the epicenter (10°). We are dealing here with sources whose magnitudes are not comparable to those of large earthquakes. Small earthquakes may be detected at distances larger than the confidence limit above but not reliably so. For the 1-kiloton snots, the range of observation is reduced from 600 miles to about 300 miles (5°).

A local network of stations, such as that operated by Pasadena or Berkeley can locate local epicenters, if shocks are well recorded, to an uncertainty of the order of 5 kilometers (3 miles). These irregular nets of stations are of the order of 50 or 75 miles lattice spacing.

For large earthquakes, from the data of many stations, epicenters are given by the United States Coast and Geodetic Survey to an accuracy of ½° (about 50-mile accuracy) and times are given to about 1 second. For smaller earthquakes, origin times of the order of 1 second are possible and epicenters of the order of 3 miles as indicated above are also possible. All these features are based upon the assumption of satisfactory recording.

The criterion of accuracy in question 6 is of course one of degree. With a net 50 miles on a side an accuracy of the order of 3 miles is certainly possible.

LEET. With present instrumentation, I believe an underground explosion might be recorded in some manner, though not usefully, at distances of:

1 kiloton	800
10 kilotons	1,200
100 kilotons	1,500

These ranges could be extended considerably with relatively little research and development.

LEPP. No answer.

LINEHAN. This is difficult to answer, as much depends upon the method of packing the charge, the depth of packing, and the geological structure of the mine where the explosion took place. Given optimum generation conditions, and instruments designed for such recordings, I believe that 1 kiloton could be detected for several thousands of miles.

LYNCH. Not beyond 5,000 to 6,000 miles.

MURPHY. Distances for detecting underground explosions with yields of—

1 kiloton: 300 to 500 miles
10 kilotons: up to 3,000 miles
100 kilotons: all sensitive stations within P range (7,000 to 8,000 miles).

These distances are based on present instrumental capabilities. With improved, more specialized instruments, these distances would naturally increase.

NUTTLI. An underground nuclear explosion of equivalent yield of 1.7 kilotons (Rainier) occurring at an unknown time and in an unknown place could be detected only at distances substantially less than 1,200 miles. My statement is based on the appearance of the Fayetteville, Ark., seismogram of the Rainier test.

I do not possess the necessary information to know the distances at which 10-kiloton and 100-kiloton explosions could be detected.

OLIVER. This question is difficult to answer briefly since so many complicating factors are involved. Of special importance are the environment of the explosion and the noise level at the recording site. An example of the latter effect can be found in the case of Rainier. This shot was detected weakly at College, Alaska, but undetected at all stations on the east coast of the United States, all at about the same distance, presumably because of the higher noise level there. On the other hand, Rainier appears to have made relatively small seismic waves for an explosion of that size. For example, quarry blasts of the order of 0.04 kilotons are regularly recorded at distances of the order of 200 miles.

With these qualifying remarks in mind I would make the following estimates.

Size:	*Maximum distance generally detectable*
1 kiloton	400 to 700 miles.
10 kilotons	2,000 to 4,000 miles.
100 kilotons	Worldwide.

POULTER. I would anticipate that the greater the distance the more nearly underground nuclear shots will resemble earthquakes. Using the only data available, namely, the Rainier shot, I would estimate that a 1-kiloton would be recorded at 1,400 miles, a 10-kiloton at 3,000 miles, and a 100-kiloton over most of the earth; however, I would anticipate that the intensity would be so low that it could easily be lost in local background noises or passed up as having little or no interest. One would also anticipate from the Rainier shot that a 10-kiloton shot could not be felt at distances greater than 6.5 miles and a 100-kiloton shot at distances greater than 18 miles. My best estimate is that a trained observer would detect as something to be investigated a 1-kiloton shot at 350 miles, a 10-kiloton shot at 800 miles, and a 100-kiloton at 2,500 miles.

PRESS. Assuming use of the best possible instruments located at sites with least background disturbance: 1 kiloton, 1,000 kilometers; 10 kiloton, 5,000 kilometers or more; 100 kiloton, all distances.

RAITT. This question requires familiarity with seismic records of both earthquakes and of blasts of much greater size and distance than I have studied. Other seismologists are better qualified by personal experience to make a judgment on these questions than I. However, I would like to make the general comment that detection prediction is certain to be inaccurate, for it depends on many unknown factors which vary widely from place to place and from time to time. The maximum distance at which an explosion is detected depends not only on the size of the charge. It depends on the fraction of energy radiated as seismic waves, on the propagation of the waves to the receiver and on the local interfering disturbances. Each of these categories will change with locality, and the background disturbance will vary with time as well. Furthermore, in many areas the background noise is manmade and controllable. It is not incon-

ceivable that tests could be concealed by deliberate disturbances created near the receiving stations.

RICHTER. Assuming use of the most sensitive instruments at locations remote from sources of disturbance (such as traffic, heavy machinery, ocean waves, running water, etc.):

1 kiloton: 700 miles or more.
10 kilotons: 5,000 miles or more.
100 kilotons: anywhere.

ROMNEY. The detectability for a shot in the 1-kiloton class is rather well known as a result of the Rainier explosion. Detectability of larger shots is much more speculative since seismic scaling laws are not well known. Following is my best estimate.

Yield	Detectable distance of P waves (degrees of arc)	
	Average station	Exceptionally quiet station
1 kiloton	6°	[1] 8°
10 kiloton	[1] 10°	[1] 13°
100 kiloton	95°	95°

[1] Also detectable in zone between 19° and 33°. Shear waves will also be detectable to distances of the order of 15° but will not generally be useful for diagnostic purposes.

SLICHTER. No answer.

TOCHER. No answer.

TUVE. We have never undertaken to observe any nuclear explosions. Our Carnegie equipment is for field use only, and does not record continuously. I might say that we observed TVA explosions during the period 1947–49 at distances of 1,400 and even 20,000 kilometers. The charges were of the order of 500 to 800 tons of ordinary explosives. We observed the Ripple Rock blast from Vancouver Sound a month ago, at a distance of 3,800 kilometers.

WALTER. This question is quite involved. Instrumental sensitivity, noise level background at the point of observation, and efficiency of such explosions as seismic wave generators are but some of the major factors entering the picture. Assuming good operating conditions, that is high sensitivity instrument with a quiet noise background such as in the Canadian shield area, fair seismic detection should occur as follows:

	Miles
1 kiloton	1, 000
10 kilotons	1, 500
100 kilotons	2, 000

WILSON. In answering this question, I would like to make reference to a publication of the Geophysics Research Directorate, Air Force Cambridge Research Center, Air Research and Development Command, Publication No. 87 in their series, Air Force Surveys in Geophysics entitled "An Estimate of the Maximum Range of Detectability of Seismic Signals," by N. A. Haskell, March 1957, ASTIA No. AD–117198. This report indicates that an underground explosion with an equivalent yield of 1 kiloton might be recorded at distances as great as 700 miles. With a yield of 10 kilotons the distance might be as much as 1,300 miles, and of 100 kilotons perhaps as much as 2,300 miles.

In the light of present knowledge, I think these estimates are quite realistic. Knowing in advance that such an underground explosion was to occur and knowing the approximate time at which it was expected, these distances might be extended somewhat.

WORZEL. This question is complicated due to the varying absorption of layers at different locations. My estimates would be that a 1 kiloton could be detected about 500 miles. 10 kilotons could be detected about 3,000 miles and 100 kilotons at any decent station.

4. Under the circumstances of question 3 at what distances would the records be of sufficient quality to permit an accurate epicenter determination? How accurately would the time and location be determined?

BAILEY. In the case of the 1-kiloton contained explosion, I would expect the records to be of sufficient quality for accurate epicenter determination up to 150 or 200 miles, assuming a sufficient number of stations at quiet locations, operating normally at high sensitivity and without earthquake interference. At these distances the first motion would be no problem assuming the above conditions, allowing accurate epicenter determination. A 10-kiloton contained explosion could be accurately located at distances up to and beyond 25° epicentral distances, with above conditions satisfied. A 100-kiloton contained explosion could be accurately located at distances up to 90°, the above conditions being satisfied. The accuracy of time and location is a function of the accuracy of time control and drum rate of recorder, quality of trace, signal to noise power ratio, experience of personnel reading the seismograms, and precision of computational procedures adopted in making the epicentral determination. Standard errors of station readings from Pacific sources are given in "Seismic Wave Travel Times from Nuclear Explosions" by Dean S. Carder and Leslie F. Bailey to be published in Bulletin of the Seismological Society of America in the fall of 1958. First class stations in Western United States have standard errors from megaton explosions at Bikini of 0.1 to 0.3 seconds. Taking a standard error of 0.2 seconds as average for presently achieved quality of chronometer and drum rate and an apparent velocity 6.0 seconds per degree near 70° epicentral distance the readings from a single station will indicate epicentral distance with a standard error of 2 nautical miles on the average. The meantime anomalies for these stations vary from 0.7 seconds for Reno to −0.5 seconds for Isabella, both of which are more than 3 times their standard errors (0.13 for Reno, 0.08 for Isbella) and so are to be considered statistically significant. If a new surveillance net is to be established to monitor underground nuclear tests, these anomalies would have to be determined for each station before the precision estimated above could be taken as nearly equal to the effective accuracy of location. Next, assuming that reliable meantime anomalies were previously determined and then applied in the computational procedure, the standard error of an epicentral location varies as the reciprocal of the square root of the number of stations of this quality surrounding the epicenter. In the above case, for a standard error of 2 nautical miles, good records from 12 stations symmetrically placed about the epicenter would reduce the standard error to about 1 mile. The above discussion assumes that we know the travel time to working distances to a high

degree of precision. At present we know the travel times of P moves more accurately than those of any other phase. Due to variations in the thickness and velocity of the layers of the earth's crust, there is some variation in the travel time curve from one locality to another. We are able to determine it with a standard error of 1 or 2 tenths of a second for any locality if we have enough stations of high quality in that area recording several earthquakes or explosions within a few hundred miles of these stations.

BEERS. Same circumstances, same distances. The accuracy in time and location would depend upon existing arrangements in the detection system. Arrangements could be provided so that the time accuracy would be ± 0.10 seconds, or, alternatively ± 1.0 seconds. Corresponding errors in locations would be of the order of ± 1 kilometer, or, alternatively ± 10 kilometers, standard deviations.

BENIOFF. No answer.

CARDER. If five or more high-class stations with precision time control are located within favorable distances, distances given in [reply to question] 3 apply, because in [reply to question] 3 estimates were made on the premise of no previous knowledge of event. With 5 favorably located stations, location of an event may be estimated within 10 miles and time at the origin within 1 second. If 20 stations are available, locations within 5 miles in an unknown country and within 2 or 3 miles in a fairly well-known country and origin time within 0.3 seconds are possible. An unknown country becomes known on repeated observations.

DONN. Explosion time could be determined to a second, and possible location to one-half degree or less, depending on the number of stations.

EVERNDEN. No answer.

EWING. See reply of Dr. Jack Oliver.

GUTENBERG. See the answers to No. 3. If the data are good, the time of the explosion can be found within a few seconds, the location within 5 or 10 miles if stations record the explosion in various directions from the source and at distances within 50 miles. The accuracy of time determination will still be within about 5 seconds if there are a sufficient number of stations at distances beyond 1,000 miles in various directions from the source. The location of the source can then be found within a radius of about 20 miles for one of the larger atomic explosions. Both the time accuracy and the location accuracy decrease as the number of observing stations decreases and especially if there are larger sectors, especially over 100°, in which there are no stations; that is if most stations are more or less in the same direction from the source.

HASKELL. Possibly about two-thirds of the above ranges, say:

	Miles
1 kiloton	550–1, 100
10 kilotons	1, 100–2, 200
100 kilotons	2, 100–4, 300

Origin time should be determinable to within about 1 second. If the actual ranges of detection were between 550 and 1,100 miles it is believed that the point of origin could be located to within a radius of 5 miles. For the 1,100 to 2,200-mile interval the corresponding positional accuracy might be 7 miles and for the 2,100 to 4,300-mile interval it might be 9 miles.

HEINRICH. The distances at which seismic waves would be recorded, so that an epicenter might be determined from the records of several stations, would be expected to be greater than the distances for interpretation of records from a single station.

The latter requires essentially an integral seismogram showing the many phases and characteristics of the disturbance.

The former might only require a single phase or event on several station records.

HEROY. The accuracy of an epicentral determination depends on: (1) The clarity of the signal; (2) the accuracy of time readings at the several stations; (3) the number of stations recording the event; and (4) the geographic location of the stations recording the events in relation to the epicenter.

If there are enough properly located stations, an epicenter can be located within a radius of 10 miles. The time of the event would be determined within 2 seconds.

HOWELL. It takes arrivals at 2 stations to locate the epicenter (actually 3 stations are required, but 2 stations give a choice of 2 possible epicenters, 1 of which can usually be easily eliminated). The distances at which accurate epicenter determinations would be possible are substantially less than those given in question 3. The accuracy depends on the quality of the record, and decreases somewhat near the fringe of observability. It is possible that instrumentation could be designed for the detection of explosions of this kind which would be much better than the standard instruments which we now use. This is particularly true if such instruments were put in abandoned mines or in the bottoms of boreholes. Such a program would be expensive in terms of the budgets which most seismic observatories now have, but are not by any means high compared to most types of research. I believe that a $100,000 spent on this problem would result in a very substantial increase in our ability to detect phenomena of this sort. Indeed it is very possible that such research has already been done by those concerned with our atomic tests. Dr. H. E. Tatel at the Carnegie Institution of Washington has made some tests of this sort.

KNOPOFF. See answer to question 3.

LEET. Under the circumstances of question 3, records of sufficient quality to permit an accurate epicenter determination might be obtained at distances of:

	Miles
1 kiloton	400
10 kilotons	600
100 kilotons	750

(There is an important unknown that influences the answers to questions 3 and 4: the rock or material in which the explosive is buried, and the manner in which it is buried.)

LEPP. No answer.

LINEHAN. Again the quality of the records would depend upon the conditions of the charge as outlined above. Also, methods could be developed where several stations might locate an epicenter, although the quality of the records would not permit a single station to make a location.

LYNCH. With present equipment not beyond 600 miles approximately. Time would be accurate within a second or so—location—a mile or so.

MURPHY. Since the basic procedure for locating the source of an explosion is the use of a simple form of triangulation, 3 stations situated on azimuths approximately 120° apart would suffice. The stations situated at distances given in question 3 would necessarily have good first arrivals. If there is any doubt about the first arrivals, additional stations are required to locate the source. Frequently in earthquake work which uses the same principle we are able to determine an epicenter with 3 stations and later find the location confirmed by data from additional stations. Such locations may be accurate to the nearest 5 to 10 miles in latitude and longitude and ±3 seconds in time.

NUTTLI. For a 1.7 kiloton explosion, it should be possible to determine the epicenter accurately from stations of less than 300 miles distance. (The latter figure is probably a somewhat conservative one.) The time could be determined with an accuracy of 1 second, and the location with an accuracy of about 5 miles. The latter values would assume that the seismologist had previous information concerning the geological structure of the region.

OLIVER.

Size:	*Sufficient quality for accurate epicentral location at—*
1 kiloton	300 to 500 miles.
10 kilotons	1,000 to 2,000 miles.
100 kilotons	Worldwide.

I do not believe there are enough data available at the present time to answer this. If recorded on three or more stations, the epicenter could be located with sufficient accuracy that if it were in a populated area by interviewing the people who were in the area at the time, he could most likely determine whether the area was small indicative of an underground shot or 600 times as great indicating an earthquake.

POULTER. If the area were not populated, which would most likely be the case if it were a nuclear test shot, it could probably be located to within 5 to 10 percent of its distance from the closest seismic station recording the event.

This might still leave a very large search area, and an aerial search would be meaningless unless the weathered rock surfaces were a strikingly different color from the freshly broken surfaces. Judging from the Rainier shot a ground inspection team might well miss the surface cracks and similar evidences unless they passed within a horizontal distance less than half the burial depth.

The epicenter location for underground nuclear shots at comparatively short distances of 10 to 30 miles should be appreciably more accurate than for earthquakes, perhaps as close as 5 percent of the distance from the closest station.

PRESS. Records would be of sufficient quality to permit accurate epicenter determination at the distances listed in 3, although principal use will be made of records at distances less than about 100°.

RAITT. See answer to question 3.

RICHTER. Distances for epicenter location are the same as for detection, provided that usable records are written at several stations in different directions from the source. Stations over 7,000 miles distant would be of relatively little use, even though recording the shock waves.

Time of occurrence can be determined with error not likely to exceed 2 seconds.

Location should be good within 7 miles, using stations not over 1,000 miles distant; within 15 miles, using only more remote stations.

ROMNEY. P waves detected in 3 above would be of sufficient quality to permit an accurate epicentral determination. Assuming detection at many stations surrounding the source, the epicenter would be located within 5 miles if stations were at distances less than 1,000 miles, and within 10 miles if stations were more distant. The times would be accurate within 1 to 2 seconds.

SLICHTER. No answer.

TOCHER. No answer.

TUVE. No answer.

WALTER. Under the conditions of item 3 and assuming good recording of seismic wave types, records within the distances cited should yield an epicentral determination. Origin time could probably be estimated to plus or minus one-tenth of a minute and location within ± 100 miles.

WILSON. For a determination of the epicenter, the distances given in question 3 would have to be reduced to half or less. The accuracy of the time and location determinations would then depend primarily on the distribution of the recording stations.

WORZEL. Under conditions of 3 I believe epicenters could be located at about 400 miles for 1 kiloton, 2,000 miles for 10 kilotons, and from any first class stations for 100 kilotons.

5. At what distances would the records contain diagnostic information that would aid in distinguishing between an earthquake and an underground explosion?

BAILEY. Direction of first motion on the vertical component is perhaps the most important diagnostic information which may be obtained. If the signal to noise power ratio at the beginning of the P phase is 10 or more to 1, the first motion is quite reliable. If this ratio is only 2 or 3 to 1, first motion estimates are of little value. This is true at any distance. At 40° to 60°, the interval PcP–P is 0.4 to 0.3 seconds longer for surface focus or buried explosions than for earthquakes at 33 kilometer depth, according to the Jeffrey Bulletin Seismological Table of 1948. This has the advantage that the ray paths are so nearly vertical that the effect of variation of crustal structure tends to cancel itself out. On the other hand, PcP is not often identified with the accuracy required by this method. If the distance to the station is similar, seismograms of earthquakes have nearly the same distribution of energy with frequency as those of underground nuclear tests such as Rainier. Blasts are not identifiable on a seismogram as high frequency waves riding on low frequency waves on earthquake origin if both are at nearly equal epicentral distance from the station. Spacing of stations would have to be of the order of depth of focus to use the California Institute of Technology point of inflection method to distinguish very shallow earthquakes from blasts.

BEERS. The distances would be of the same order as in No. 3.

BENIOFF. Generally speaking, explosions can be differentiated on seismograms from earthquakes, especially if enough such records are available from a suitable network of stations. Nearly all earthquakes occur at depths substantially greater than those that can be expected

from underground explosions and these differences are detectable. In addition, the pattern of first motions observed at various stations from blasts differs from that of earthquakes.

CARDER. Records at distances in 3 would give some diagnostic information between earthquakes and underground explosion. There is no absolutely certain diagnosis.

DONN. No answer.

EVERNDEN. As I see it, any explosion must be recorded at several stations in varying azimuths in order to insure its identification as of explosive origin. As you no doubt know, the record of the Rainier shot at Berkeley was virtually indistinguishable from that of an earthquake, the development of transverse or shear waves being well beyond all expectations. I feel certain careful study of the records from the Rainier shot or from similar shots will establish criteria for identifying them unequivocally as of explsoive origin. It will not be as simple as had been expected, however. As I know nothing of the nature of the explosive source used on the Rainier shot, I must presume that it introduced no assymmetry into the radiation pattern but that this assymmetry (with the associated development of shear waves) was introduced by the physical and geologic conditions of the explosion site. I suspect that if a nuclear explosion took place in a hole in the middle of an alluviated valley, there would be little development of shear waves and the identification of the seismic event as due to an explosion would be very simple.

EWING. See reply of Dr. Jack Oliver.

GUTENBERG. No answer.

HASKELL. Same as in 4.

HEINRICH. My answer to this question is similar and related to the answer to question 3. My experience with seismograms of nuclear explosions in the near distance range is too limited to set a value.

My experience with TVA dynamite blasts recorded at St. Louis gives me the order of magnitude of 450 miles. I hesitate to transfer this experience to nuclear blasts, because I do not know that the two phenomena are directly transferable.

HEROY. From short-period recordings and for small energy (1 kiloton–10 kilotons) underground explosions, no positive criteria for distinguishing blasts from earth quakes are now available.

If enough data are obtained from enough stations, a distinction can be made by determination of the first motion of the energy release. This is a factor more of density and clarity of data than of distance from energy source. Distance, in itself, is not the controlling factor.

HOWELL. I do not know the answer to this. I believe this could be determined by research on our own explosions. I suspect that there are people who have done this research, but I do not know who they are, as the work has been classified.

KNOPOFF. This question assumes that earthquake sources and underground explosion sources would produce markedly different records at some distance. We have analyzed the mathematical problem of a shear source (earthquake source) and a dilatational source (explosive source) in a homogeneous region overlain by a single homogeneous layer. We find that, superficially, the seismic records that we predict at distance are indistinguishable as to nature of source (earthquake or explosion) or depth of source (i. e., whether the sources are superficial as in explosions or at depth as in earthquakes)

when the sources are restricted to lie in or on the upper layer. "At distance" refers to epicentral distances greater than a few thicknesses of the upper layer. To be sure there is a noticeable change in the fine structure of the theoretical records at distance with change in source type, but these are not diagnostic in the case of more complicated, unknown geometries. The predictions, even with the above "simple" geometry, show records of high complexity.

At short range—i. e., epicentral distances of the order of the layer thickness—the theoretical predictions are markedly different. Here the difference between earthquake and explosive sources will be in evidence upon single records; but again, for complex structures—i. e., many layers of the order of kilometer thicknesses—the sites where these features are diagnostic are located within only a few kilometers from the epicenter.

We conclude that single records are not diagnostic as to the nature of the source for practical ranges. It is geometry which determines the character of the records rather than the nature of the source.

If, however, several records are intercompared from stations surrounding a source, then diagnostic material can be obtained. The criterion for this analysis would come from "first motion" studies. The first motions at a suite of stations surrounding the epicenter should all be "up" in the case of an explosion. These motions should be "up" at some stations and "down" at some stations in the case of an earthquake source. This difference should be reliably detectable at stations say at range one-half the detectable limit (see question 3). For the minimum size suggested, a grid of stations about 50 to 100 miles on a side would be a minimal value. With a fine enough grid this method of identification is diagnostic.

LEET. The records probably would not contain diagnostic information that would aid in distinguishing between an earthquake and an underground explosion at distances greater than those of question 4.

LEPP. No answer.

LINEHAN. Answer unknown without suitable tests. I have worked with records of blasts up to 300 miles, where distinction could be made.

LYNCH. At any distance. The record of an artificial explosion can be differentiated from a natural earthquake—the former is a point source whereas a natural quake has an extended source—the compression phase of the record is short lived in the former and more prolonged in the latter.

MURPHY. The records would be good for locating the source but would not provide data for distinguishing between an earthquake and an underground explosion.

NUTTLI. From my observations of the 15 explosions mentioned in No. 1, I can say that nuclear explosions recorded at a distance of approximately 6,500 miles (the distance from Bikini to St. Louis) have certain peculiar features which enable them to be distinguished from earthquakes.

The reproductions of the seismograms of the Rainier test from "near" seismograph stations lead me to the conclusion that it is much more difficult to differentiate between an earthquake and a nuclear explosion at a distance of a few hundred miles.

OLIVER.—

Size:	*Diagnostic information for identification*
1 kiloton	About 200 to 400 miles.
10 kilotons	About 1,000 miles.
100 kilotons	Worldwide.

POULTER. There is not sufficient information available at the present time to answer this, except to say that the closer to the source the greater will be the difference between the records of an underground explosion and an earthquake.

PRESS. The main diagnostic information which would be of use in distinguishing between earthquakes and underground explosions is the presence of longer period body waves and surface waves. These events would be separated on the seismograms at distances beyond 1,000 to 5,000 kilometer.

RAITT. See answer to question 3.

RICHTER. I understand that such diagnosis is possible, but do not have detailed information necessary to judge its relation to distance. Any such evidence would be more convincing if found on seismograms at several stations than if dependent on one station only.

Study of differences between times of recording at near and at very distant stations could furnish evidence that the source was at or near the surface of the earth.

ROMNEY. Under conditions similar to those of the Rainier blast, the seismograms from a 1 kiloton shot would have diagnostic information aiding in distinguishing from an earthquake to a distance of approximately 200 nautical miles for an average station location. A 10 kiloton shot should have similar information at a distance of about 400 nautical miles. A 100 kiloton shot should contain this information at all distances except perhaps in the range between 800 and 1,100 miles.

SLICHTER. No answer.

TOCHER. Records of the Rainer underground test written at the University of California stations had no characteristics which, to me, would have suggested anything other than an earthquake. Our closest stations, at Reno and Fresno, are about 200 miles from the test site.

TUVE. No answer.

WALTER. Generally speaking, the closer to the source, the more diagnostic the recording.

WILSON. I have no information that bears on this question. This does not mean that an intensive study of this subject might not furnish some information that could lead to an answer.

WORZEL. No answer.

6. What is the minimum number of stations that would be required to get an accurate epicenter location?

BAILEY. As indicated in the answer to question 4, the standard error of epicentral location varies as the reciprocal of the square root of the number of reliable stations surrounding the epicenter. I use the word "surrounding" advisedly because the quality of location may be demonstrated to be much lower if the stations are all on one side of the epicenter. If all but one are on one side, the single station on the opposite side carries too much weight, and an error in identifying the correct arrival time at that single station will go unchecked by dis-

crepancies with other stations on that side of the epicenter. The latitude, longitude, origin time, and depth of focus are parameters which must be computed from arrival time data in accurate work. Four stations are the absolute minimum required to obtain a unique solution for the above four parameters. To obtain an estimate of accuracy which is reliable, several more degrees of freedom are necessary for statistical least square computation. This implies good quality readings at several stations. The minimum number which you require is a function of: (*a*) Station location and spacing, (*b*) background noise and earthquake interference at the time of the recording, (*c*) the accuracy of timing, interpretation and computation, (*d*) accuracy of determination of the local and regional travel time curve. Eight to twelve recording stations would give good control if they are distributed in all quadrants about the epicenter.

BEERS. A minimum number of stations is three, all of which must record the event, for detection, under Rainier conditions. More stations would reduce the error of epicenter location.

BENIOFF. No answer.

CARDER. Five stations is the minimum for good results and they must be distributed in all quadrants about the event. This means that five stations in a small area probably can locate an event within that area if within the capabilities of the instruments. It does not mean that five widely scattered stations can locate any event in a vast area. Many more stations are needed for this. (See 15.)

DONN. Would vary; 3 to 10.

EVERNDEN. No answer.

EWING. See the reply of Dr. Jack Oliver.

GUTENBERG. For accurate location at least about 10 stations are needed in various directions covering at least a half circle. See also answer to No. 4.

HASKELL. Three.

HEINRICH. Assuming all stations of equal ground and instrument sensitivity and time-recording accuracy, and assuming all stations are functioning properly, within the zone of waves, a minimum of four should be required. More are desirable for check purposes.

HEROY. These should be at different bearings and/or distances from the epicenter, and show accurately the times of the P and S phases.

HOWELL. Three is generally required, but a good guess can be made with two. See question 4 above.

KNOPOFF. See answer to question 3.

LEET. This would depend on the stations' distribution in direction from the source. Three might do it under favorable conditions. Ten might fail to do it accurately. Under the best conditions, location within a circle of a radius of a mile might be possible. This depends on the distance as well as the station arrangement and all these answers assume presently available equipment and methods. With modernized instrumentation, both distance and accuracy could be increased substantially.

LEPP. I believe that three stations would be an absolute minimum.

LINEHAN. Depending on the station locations, the type of equipment, etc., three would be minimum.

LYNCH. Three, provided they are not all on one line.

MURPHY. As stated in No. 4, 3 stations with good first arrivals which may be scaled to the nearest 0.1 to 0.3 second would suffice

but more confidence could be placed in the locations if additional station data were available for confirmation. These stations must be within the ranges where good recordings are obtained.

NUTTLI. In theory the minimum number of stations required to obtain an accurate epicenter location is three. In practice, the number is larger, because one must be certain that the seismic waves which are being used for this epicentral location have all originated from the same source, and that they are not caused by separate local earth disturbances in the vicinity of the various seismograph stations. Also, the location and spacing of the seismograph stations would influence the number required to locate the epicenter accurately. I would estimate that approximately 10 properly spaced seismograph stations would be the minimum number required.

OLIVER. Theoretically 3, in practice, at least 4 or 5.

POULTER. This would be dependent upon their distance from the epicenter and their relative position, but under the most favorable conditions a minimum of three would be required; and the accuracy should increase with an increasing number of stations.

PRESS. The more stations reporting the more accurate the epicenter location. If I were in the detection business I would be reluctant to operate with less than 10 stations for a single determination.

RAITT. See answer to question 3.

RICHTER. Three stations in different directions are absolutely necessary. In most cases at least 10 would be needed.

ROMNEY. Ordinarily, at least 4 stations are required for an epicenter determination; however, at small distances, 3 stations will suffice if their azimuthal distribution with respect to the epicenter is satisfactory. The precision is lower than that given in answer 4.

SLICHTER. No answer.

TOCHER. No answer.

TUVE. No answer.

WALTER. Three.

WILSON. Theoretically 3, but in practice at least 5.

WORZEL. The minimum number of stations to reliably determine the accurate epicenter would be five well-located stations.

7. With this number of stations, do you believe that a detected event could be identified as a blast rather than an earthquake? If so, what features of the seismic wave enable you to make this identification? Further, could this identification be made on 100 percent of the disturbances located? 90 percent? 50 percent?

BAILEY. A detected event could be identified as a blast if the signal to noise ratio is sufficiently high at several stations. This identification would not be unambiguous. However, if several stations surrounding the shot point recorded compressional first motion in the P phase with a high signal to noise ratio, the ratio of the amplitude of first motion to average amplitude of P phase should be more nearly constant for blasts than for earthquakes. Stations at quiet locations spaced 50 to 70 miles apart would be close enough to give this type of information except during the P and S phases of large earthquakes within 15° of the station.

With stations at these distances, high pass electrical filters may be used to emphasize frequencies of about 40 cycles per second which are high enough to show nearby surface reflections from buried shots.

This is the pP phase of earthquake seismology, which will be seen within the first quarter of a second of the P phase for a buried shot. Without high pass filters, the pP phase will be invisible in the P group. This phase must be identified consistently on several station records before it can be used for blast identification.

In quiet locations as in Central Asia, perhaps 90 percent could be identified in one of these ways. In noisier areas as on Pacific islands, 50 percent would be much too optimistic a figure.

BEERS. Under Rainier conditions, yes. Factors bearing on the problem include: Types of waves observed, periods, decline of wave amplitude with distance from explosion, duration of recorded waves in time, location and circumstances at epicenter, and depth of burial of explosion. Identification would be 100 percent only if theoretically optimum detection system characteristics were in operation at the time of the explosion. The probability of detection can be calculated for each size of explosion and for each distance, provided all the detection system characteristics are fully known in advance. If a definite probability is required, a system could be designed to meet it.

BENIOFF. See reply to 5.

CARDER. (*a*) Suppose that five or more stations are distributed in all quadrants about a seismic disturbance. If the disturbance is a blast, initial ground motion is generally outward in all directions and the leading wave at each station, if normal background or noise permits, is recognized as a compression. If the event is an earthquake, some of the leading waves are compressions and some are rarefactions. Thus if five stations distributed in all quadrants each show clear compressions on the leading waves, the event may be a blast. Records from blasts and shallow earthquakes are otherwise difficult to distinguish, especially in the distance range up to about 1,200 miles.

DONN. Explosions, especially if in a homogeneous area, should produce compressional ground movement radially from the blast. This is not so for earthquakes. Also, explosions usually produce seismic waves of very high frequency compared to earthquakes. Of course, we have never had deep explosions of 5 to 100 kiltons so that the latter information might need revision.

EVERNDEN. See reply to 5.

EWING. See the reply of Dr. Jack Oliver.

GUTENBERG. This depends on the size of the explosion. I do not have sufficient information to estimate the percentages.

HASKELL. The transverse (shear) waves resulting from a blast should have smaller amplitudes relative to the longitudinal (compression-rarefaction) waves as compared to the amplitudes of the corresponding waves in earthquake records. There may also be differences in the characteristics of the surface waves that could aid in the identification. It is believed that a reliability of 90 percent or better could be achieved if an extensive background of statistical data were available.

HEINRICH. Interpretive detection requires experience in actual recording. My experience has been with seismograph records of dynamite (or similar) blasts compared to records of the seismic waves from earthquakes. St. Louis records of dynamite blasts compared with earthquakes show differences. The duration of individual phase bursts are smaller, fewer individual phases and bursts appear, and the

overall duration of the disturbance is less for dynamite blasts than earthquakes.

HEROY. No.

HOWELL. It is very difficult to distinguish a blast from an earthquake. I believe, however, that a blast will generally give a greater percentage of surface waves compared to body waves, and that the sharpness of the pulses can be expected to be greater. The degree to which this is true has yet to be determined by experiments. It would be difficult to distinguish between the two in all cases unless very good records were obtained. Even then it might not always be possible. However, if epicenters were accurately determined, and someone could go to the region of the epicenter to look for the effects of the earthquake, then one might be able to distinguish atomic blasts from natural earthquakes.

KNOPOFF. See answer to question 5.

LEET. With present equipment, I'm not sure how to answer this. From what we do know, however, I believe it would be possible with proper equipment to make positive identification on 100 percent of disturbances located. Relative energy in P and S; earth periods in general; and relative energy and periods in L would be diagnostic features.

LEPP. Have not had sufficient experience to comment intelligently.

LINEHAN. Within the distances that I have studied, I would say that a blast could be distinguished from an earthquake. For greater distances tests would have to be operated. In the past we have used the amplitude ratio of the P and S phases for distinguishing the type of disturbance. With several stations operating from various azimuths from the epicenter the time of closure of the origin times could be used. I feel that 90 percent of the disturbances could be identified.

LYNCH. Yes; the duration of the compression phase as mentioned under 5. Close to 100 percent.

MURPHY. There is no positive means for differentiating between a blast (underground explosion) and an earthquake. For a blast the initial motion when clearly recorded is a compressional type movement. In an earthquake it can be either a compression or rarefaction. Information is unknown whether 100 percent, 90 percent, and 50 percent of these disturbances can be identified.

NUTTLI. The differentiation between a blast and an earthquake would, in my opinion, depend more on the distance than on the number of stations. At the large distances (I can only speak with certainty of the St. Louis distance from Bikini of 6,500 miles) one of the prominent wave types produced by earthquakes, the shear wave, does not appear on the seismograms of nuclear explosions. This is a very distinctive feature. If the epicenter can be located, it should be possible in all cases to identify the disturbance as an explosion, rather than an earthquake, on the basis of the lack of shear waves at stations several thousand or more miles from the source. This would assume that the explosion could be recorded at these distances.

The above statements do not apply for stations located within a few hundred miles of the explosion. For these stations the shear waves do appear (they are caused by reflection of other type waves at boundaries within the earth), and the seismograms look very similar to those of natural earthquakes.

OLIVER. Not with certainty with present techniques. The best method is probably the use of the initial motion on the seismogram. One definite dilation would identify the event as an earthquake. However, the converse—i. e., no dilation means an explosion—is not true when the network and area of detection are limited. Assuming 4 stations recorded the shock well, about 80 to 90 percent of the shocks could be definitely identified as earthquakes if they all were. The nature of the source for the other 10 to 20 percent would be uncertain.

POULTER. Not unless these stations were at a comparatively short distance from the disturbance and very good quality records were obtained. For short distances from underground explosions the pressure wave will predominate whereas the shear wave will be strong even at short ranges for earthquakes.

I believe it would be extremely doubtful if one could differentiate between the two 100 percent of the time even at a rather close range, perhaps 75 percent at a few miles, and down to almost 0 percent at the greater distances.

PRESS. With information available to me at the present time, I would say that 20 kiloton and higher blasts could be distinguished from earthquakes, blasts in the 1 kiloton class could not be distinguished from small local earthquakes. Where the crossover point occurs between 1 kiloton and 20 kilotons is questionable but could be answered by some experiments. The features of the seismic wave that I would use to make this identification are the spectrum in the body wave, particularly S, and in the surface waves. In addition, the type of surface wave would be diagnostic. For 20 kilotons and larger blasts this identification could be made for more than 90 percent of the cases. At the present time 1-kiloton blasts could not be distinguished from small earthquakes.

RAITT. See answer to question 3.

RICHTER. Identification does not depend primarily on number of stations, but will be more positive with more records; see answer to 5. I lack information adequate to estimate the percentages asked for.

ROMNEY. No.

SLICHTER. I would expect that the smaller explosions would be very difficult to distinguish from a minor earthquake. But, in the end, I would expect a modern program, well instrumented with suitable seismographs, and employing the best means of analyzing the records, to succeed in detecting almost all the large blasts—say 90 percent, or more, of these.

TOCHER. No answer.

TUVE. No answer.

WALTER. (*a*) Possibly.

(*b*) Features that would render possible the distinction are smallness or lack of shear waves and surface waves and/or the presence of the hydrodynamic wave type at short distances.

(*c*) I could only guess as to the percentage of successful identifications. Assuming good recording and a backlog of experience which is presently lacking among seismologists, 90 percent would seem a likely goal.

WILSON. See the answer to question 5.

WORZEL. No answer.

8. If the minimum number of stations required to locate accurately the epicenter is in your opinion not enough to provide identification, how many would you suggest to give a maximum chance of identification? Assuming this maximum number of stations is realized what percentage of natural earthquakes recorded would be correctly identified?

BAILEY. The chance of identification increases with the number of stations. Maximum chance of identification implies maximum number of stations. This is limited by available trained personnel, equipment, supply facilities, operating funds, etc.

Natural earthquakes will form well over 95 percent of all seismic events recorded excluding noise from such sources as traffic, trees, lakes, and microseisms from the ocean. The problem is to correctly identify blasts. The proportion of blasts correctly identified will depend upon the station spacing and upon the quality of the sites of the stations within recording distance. This assumes that no artificial absorptive or shielding devices are employed.

BEERS. See answer to No. 7.

BENIOFF. See reply to 5.

CARDER. If event is in a seismically active area at least 7 or 8 stations would be needed to recognize as high as 80 percent of the blasts as such, because unless blasts are frequent, nearly 100 percent of recorded events would be earthquakes and nearly this percentage would be recognized as such. In a seismically inactive area, any event would be viewed with suspicion and doubtless as few as 5 stations could distinguish 90 percent of the blasts and probably 90 percent of the earthquakes as such.

DONN. No answer.

EVERNDEN. See reply to 5.

EWING. See reply of Dr. Jack Oliver.

GUTENBERG. The more stations the better. Natural earthquakes could be located under the condition given in No. 6 if their magnitude is large enough.

HASKELL. Do not believe more stations would be required for identification than for location.

HEINRICH. The data of the analysis outlined in question 3 are required before I can give a definitive answer.

HEROY. No. Twenty properly equipped stations. This number applies if the stations are all located within 20° of the epicenter and are well distributed around it. The problem is to distinguish blasts from natural earthquakes. With this coverage, you have a 90 percent chance of distinguishing blasts and earthquakes correctly, assuming that the event in question is of sufficient size to produce good records at all stations.

HOWELL. Identification of the record as being from a blast does not depend on the number of stations but on the quality of the record at one station.

KNOPOFF. See answer to question 5.

LEET. I believe a single complete record could provide identification, regardless of location, with proper instrumentation.

LEPP. No answer.

LINEHAN. The number of stations required for optimum identification would depend upon the area to be studied, the range of the instru-

ments, the types of explosions, etc. I do feel that answers cannot be given without considerable testing.

LYNCH. Increasing the number of stations will increase the accuracy of location but not the differentiation between a quake and an explosion—one station alone will do that.

MURPHY. Six stations located in three different azimuths and within the range for recording good initial movements would provide a possible source of identification. However, in giving an answer to this question it should be realized that from the records alone we have only the compressional wave theory for distinguishing blasts and earthquakes. If rarefaction and compressional waves are recorded by these six stations the source is very probably an earthquake. If only compressional waves are recorded the source could be a blast.

NUTTLI. I do not believe that increasing the number of stations would aid in differentiating between a natural earthquake and an explosion.

OLIVER. The more the better, of course. Taking 10 as a practical limit for the small bombs the percentage identified as earthquakes would be in the high 90's.

POULTER. Since the epicenter can be located from records obtained at great distances, and the maximum chance of identifying an underground explosion occurs only for relatively short distances, the spacing between stations would, of necessity, be rather small to provide maximum chance of identification. Since distant underground explosions look like earthquakes, the main purpose that would be served by stations far removed from the disturbance would be in confirming the location. It is more difficult to positively identify an earthquake from a long distance than it is an underground shot at close range.

All records will, therefore, have to be worked up in conjunction with the records from other stations in order to give any realistic appraisal.

PRESS. This is partially answered by 7. Small magnitude earthquakes could not be distinguished from 1-kiloton blasts. The greatest percentage of natural earthquakes are small ones.

RAITT. See answer to question 3.

RICHTER. I hestitate to attempt an answer, because of possible misunderstandings. Obviously, the more stations the better.

ROMNEY. Four or five stations might suffice to identify perhaps 90 percent of earthquakes as due to natural causes. Seismograms from Rainier have disproved the common expectation that small underground explosions can be distinguished from earthquakes. In particular, it has been stated that pressure waves will predominate from an explosion whereas the shear waves will be greatly reduced compared to those from earthquakes. This is contrary to the actual Rainier observations. There remains some possibilities that major explosions will produce features identifying them as blasts. These possibilities are in the realm of speculation at the present time, since such blasts have not knowingly been observed by Western seismologists.

SLICHTER. See reply to 7.

TOCHER. See reply to 5.

TUVE. No answer.

WALTER. (*a*) The more the better.

(*b*) Same as 7 (c).

WILSON. See the answer to question 7.
WORZEL. No answer.

9. Do you believe that from seismic evidence alone you can determine unambiguously that an underground explosion has occurred? If so, under what circumstances?

BAILEY. No.
BEERS. Yes; see answer to No. 7.
BENIOFF. No answer.
CARDER. Only if event is in a seismically inactive area but not unambiguously as a nuclear explosion unless magnitude of the event is beyond the energy range of a nonnuclear explosion.
DONN. Uncertain, but frequency initial ground motion and place of occurrence would be helpful clues. If suspected explosions are located in a nonseismic area, chances of detection are much better.
EVERNDEN. See reply to question No. 5.
EWING. See the reply of Dr. Jack Oliver.
GUTENBERG. I am very doubtful about the circumstances under which one can determine unambiguously that an underground explosion has occurred. This decision cannot be made for small explosions. Small earthquakes may give a record which consists only of the first longitudinal wave without surface waves which are characteristic of large earthquakes. These have much more energy than the present explosions. Small earthquakes may occur anywhere although they are more likely to occur in earthquake belts; however, we still get earthquakes of magnitude 6 or even more almost every year from regions in which, since the beginning of useful records about 50 years ago, no earthquake has been found from records at stations all over the world. It is usually difficult to find the depth of focus for small earthquakes and to decide beyond doubt if the source was within a mile of the surface. Earthquake foci are usually deeper.
HASKELL. A completely unambiguous determination can probably not be made from seismic evidence alone.
HEINRICH. I have been able to identify certain dynamite blasts on seismograms on the basis of prior experience. There are, however, many events recorded on seismograms which lack identification.
Perhaps with some experience (research) those circumstances, under which identification of nuclear explosions is possible, could be defined. I do not have this experience at the present time.
HOWELL. With present knowledge I could not determine for sure that a record was from a blast. However, I believe that a little research would make it possible to determine in the case of good records whether the seismogram was that of a blast or natural earthquake.
KNOPOFF. Unambiguously? Not if chance, artifice, etc., are factors.
LEET. I believe that from seismic evidence alone we could determine unambiguously that an underground explosion has occurred. This would be based on complete records from three or more stations employing modern instrumental techniques.
LEPP. Yes; providing that there are sufficient stations and, of course, that the blast is sufficiently strong to be detected.
LINEHAN. These circumstances are given above.
LYNCH. Yes, provided the source is close enough for compression and shear waves to reach the observatory.

MURPHY. I have no reason to believe that an underground explosion can be identified unambiguously from seismic evidence alone. There is a possibility of such detection if the blast occurs in a definitely non-seismic area.

NUTTLI. See answer to question 7.

OLIVER. This could be done with almost 100 percent certainty if the explosion were large enough to be recorded throughout the world.

POULTER. I do not believe that it is possible to determine with complete certainty from seismic records that an underground explosion has occurred, unless a large number of closely spaced stations are employed.

PRESS. From seismic evidence alone I believe that I would correctly identify as underground explosions 90 percent or more of 20 kiloton or higher blasts. With some research this figure might be lowered to the order to 10 kilotons.

RAITT. See answer to question 3.

RICHTER. Determination would have high probability in the four following cases:

(*a*) An apparent earthquake originating outside the known seismic regions, which cover only a small part of the earth's surface. (Reference: Seismicity of the Earth, by Gutenberg and Richter.)

(*b*) Repetition from the same source at the same time of day.

(*c*) Evidence from recorded times indicating a source near the surface of the earth (see question 5). Natural earthquakes mostly originate at depths of 10 miles or more.

(*d*) Evidence of the diagnostic type not known to me in detail, referred to in question 5. I understand that some such evidence depends on the short duration of the blast as compared with a natural earthquake, resulting in certain rapid recorded vibrations characteristic of explosions. Such evidence at several stations would be conclusive.

ROMNEY. Underground explosions larger than 10 kilotons under Rainier conditions should produce initial compressions at all observing stations which record strong signals. This would imply, with a high degree of probability, that the event was an explosion rather than an earthquake; it would not be an unambiguous proof, however.

SLICHTER. No answer.

TOCHER. Underwater and above-ground atomic explosions would produce seismograms and/or microbarograms at stations 200 or more miles away which could, in all probability, be recognized for what they were. Records at a station 200 miles from an underground explosion most likely would be indistinguishable from records of an earthquake at the same distance. Occurrence of an "earthquake" in a region of low seismicity might raise suspicions that the source was an explosion, but confirmation would have to come by methods other than seismic.

TUVE. No answer.

WALTER. (*a*) Quite possibly.

(*b*) Under the circumstances of a well-recorded event at a number of stations.

WILSON. Not for the present state of the art. See answer to question 5.

WORZEL. Whenever the signal was substantially above noise level, it should be unambiguous whether there was an underground explosion. In other words, for the bigger bombs there should be no trouble.

10. Do you believe that from seismic evidence alone you can determine unambiguously that an underground nuclear explosion has occurred? If so, under what conditions?

BAILEY. No.

BEERS. Probably yes, because nuclear underground explosions would probably be very much larger than detectable TNT explosions excepting at short distances (less than 1,000 kilometers).

BENIOFF. No answer.

CARDER. See answer to question 9.

DONN. No—except, if indications are that a very large explosion has occurred, it would probably be nuclear.

EVERNDEN. No answer.

EWING. See reply of Dr. Jack Oliver.

GUTENBERG. No answer.

HASKELL. There should be no seismically detectable difference between a nuclear explosion and a chemical explosion of the same magnitude.

HEINRICH. See answer to question 9.

HEROY. No.

HOWELL. I do not believe that one can determine an underground nuclear explosion from any other kind of blast except by its size. A small nuclear explosion would be indistinguishable from a large quarry blast.

KNOPOFF. This question assumes that nuclear explosions will have different properties than nonnuclear explosions of the same energy. The only differences I can imagine between these two types of explosion are (1) rise times of the onsets of pressure, (2) different linear dimensions of the equivalent source, (3) duration (or frequency) of the source. I do not have enough information to respond authoritatively to this question but my guess is that if any differences do exist they will only be observed at seismic stations at the epicenter or near it, say a kilometer away or so. Beyond this distance the geometry of the strata will mask any features characteristic of the source.

LEET. I believe that from seismic evidence alone it would be possible to determine unambiguously that an underground nuclear explosion has occurred, if (1) modern instrumental techniques were employed, and (2) the explosion exceeded 1 kiloton in energy.

LEPP. I do not believe it possible to distinguish unambiguously between an underground nuclear and a similar chemical explosion. However, since so much more energy is liberated by even a small nuclear explosion, as compared to normal dynamite explosions, the magnitude of the shock itself may indicate a nuclear source.

LINEHAN. No.

LYNCH. No.

MURPHY. Same reply as in No. 9.

NUTTLI. From seismic data alone I believe that we could determine unambiguously that high energy yield underground nuclear explosions have occurred. However, I do not believe that low energy yield nuclear explosions, which are well recorded only to a distance of a few hundred miles, could be unambiguously identified.

OLIVER. Yes; under the conditions of question 9 and providing the magnitude is so large that conventional explosives are not a possibility. If the magnitude is so small that conventional explosions could have been used, I see no way to differentiate between nuclear and conventional explosions.

POULTER. From the experience with high explosive shots in Utah prior to the starting of the nuclear tests in Nevada and in Nevada prior to the Rainier shot, I do not believe it is possible, from seismic records alone, to differentiate between nuclear and high-explosive shots. I feel that it would, therefore, not be possible to positively identify an underground nuclear shot by seismic waves alone.

PRESS. A nuclear explosion could not be distinguished from an equivalent chemical explosion underground.

RAITT. See answer to question 3.

RICHTER. If there is an affirmative answer, it must depend on the extremely short duration of the nuclear explosion as compared to others.

ROMNEY. For the reasons mentioned in 9 above, an underground explosion in the 100 kiloton class would be interpreted with a high degree of probability as a nuclear explosion because of the impracticability of producing such an event by chemical explosives; this would not be unambiguous proof since the event would not be definitely established even as an explosion.

SLICHTER. No answer.

TOCHER. No answer.

TUVE. No answer.

WALTER. Seismic evidence could tell us that an underground explosion had occurred but when we inquire particularly if it is a nuclear explosion as distinct from some other types of explosions, it is more difficult to say. There may be specific identifying seismic characteristics in a nuclear explosion which experience will bring out.

WILSON. No. See answer to question 9.

WORZEL. Yes, provided there would be no doubt that conventional explosives were not used and the signal were substantially above noise level.

11. Do you believe that the characteristics of a seismogram utilized for distinguishing between explosions and earthquakes would be affected by variations in the depth of the explosion, the nature of the surrounding strata, or the presence of absorptive or shielding materials designed to camouflage an explosion?

BAILEY. Yes.

BEERS. The characteristics of seismograms would be affected by variations in the depth of explosion if the depth approached that of earthquakes of comparable magnitude. This in unlikely. The nature of the surrounding earth materials could affect the characteristics of the observed seismic waves but a nuclear explosion of 1 kiloton or greater would be detectable by other means (e. g., radioactivity) if it were exploded in earth materials which do not completely prevent blowout. Absorptive or shielding materials for radiation would not seriously diminish the probability of detection, with one possible exception. If a very thick layer of unconsolidated materials could provide a sufficient depth of burial to prevent blowout, it is possible that a nuclear explosion could be completely confined by this material

and the resulting seismic waves would not be detectable at distances corresponding to the detection capabilities shown in the detection of Rainier.

BENIOFF. No answer.

CARDER. Yes.

DONN. No answer.

EVERNDON. No answer.

EWING. See reply of Dr. Jack Oliver.

GUTENBERG. Yes. See answer to No. 3 for the second part of the question.

HASKELL. The factors mentioned would almost certainly have some effect but probably not enough to make diagnosis impossible. To produce any significant degree of shielding by artificial means would be an enormous problem and is probably entirely impracticable.

HEINRICH. Yes; see answer to question 3.

HEROY. The characteristics of a seismogram utilized for distinguishing between surface explosions and earthquakes do not necessarily apply to underground explosions. We do not have enough data from underground explosions at various depths or under differing geological conditions. In my opinion, it is highly doubtful if an identifiable variation in wave character could be accomplished by deeper burial or by shielding.

HOWELL. Yes.

KNOPOFF. See answer to question 10.

LEET. I do not believe that the characteristics of a seismogram utilized for distinguishing between explosions and earthquakes would be affected by variations in the depth of the explosion, the nature of the surrounding strata, or the presence of absorptive or shielding materials in thickness less than half a mile in all directions (including below).

LEPP. The depth of, and the geologic conditions around, an explosion should to some degree influence the resulting earth waves. It may be remotely possible to generate a real earthquake by a large explosion if the time and place of explosion were right. I consider this a very remote possibility.

LINEHAN. Yes. Compare conditions mentioned above.

LYNCH. No.

MURPHY. The seismogram would be affected by physical conditions at the source of the explosion.

NUTTLI. I do not believe that variations in the depth of explosion, the nature of the surrounding strata, or the presence of absorptive or shielding materials could camouflage a high-energy-yield explosion recorded at distances of several thousand miles from the source.

OLIVER. Certainly the distance to which the bombs can be detected can be affected by any of the above. This, in a sense, affects the identification capability. It might also be possible to alter the first motion pattern by appealing to depth and topographic effects, but this is speculative.

POULTER. The characteristics of the seismograms used to distinguish between earthquakes and explosions most certainly would be affected by variations in the depth of the explosions, the nature of the surrounding strata, and the presence of absorptive or shielding material used to camouflage an explosion. Admittedly, a considerable quantity of material would be required to camouflage a large

nuclear shot, but the site could be so selected that it would be in the midst of an almost unlimited quantity of absorptive material such as, for instance, thick, porous icecap.

PRESS. For all practical depths that could be achieved, variation in depth would not be a factor in altering the characteristics of the seismogram. The nature of the surrounding strata might affect the maximum range of detection to a certain extent, but this can be allowed for in determining the number of seismograph stations needed.

RAITT. See answer to question 3.

RICHTER. Yes. Also by conditions near the place of installation.

ROMNEY. The depth of the explosion would profoundly influence the first motion, which is a primary means of distinguishing natural earthquakes. If the explosion was at a sufficiently shallow depth, the reflections from the free surface above could arrive at a distant station almost simultaneously with the direct wave; since the reflection would be reversed in phase, it could produce interference which would make the determination of the direction of the first motion extremely difficult. Some seismologists believe that surface waves might be used to distinguish between earthquakes and explosions. The depth can reasonably be expected to influence the generation and spectrum of surface waves from such an explosion. There seems to be no reason to doubt that the amplitudes of seismic waves can be reduced considerably under those generated by the Rainier explosion simply by firing in a medium having a lower yield point than the tuff which surrounded the Rainier shot. This would result in considerably more energy expended in inelastic processes near the source, consequently allowing less elastic energy to escape.

SLICHTER. No answer.

TOCHER. No answer.

TUVE. No answer.

WALTER. Not significantly.

WILSON. If characteristics of the recordings of an underground explosion can be identified, that distinguish them from earthquakes, I doubt if the nature of the surrounding strata, et cetera, would camouflage the characteristics. Conceivably, other explosions set off at the same time might confuse the identification.

WORZEL. Yes, the identification is seriously impaired by reducing the signal to noise level and these changes could reduce the signal level.

12. The underground explosion, Rainier, in Nevada (1.7 kilotons) produced seismic waves equivalent to an earthquake of magnitude 4.25. How many natural earthquakes occur in the U. S. S. R. and China of magnitude 4.25 to magnitude 6? How many larger than magnitude 6? What size explosion would produce a magnitude of 6?

BAILEY. About 10 to 20 earthquakes per year of over magnitude 6 occur in the U. S. S. R. and China each year, excluding such heavy aftershock sequences as that of Kamchatka, which cannot properly be averaged on an annual basis. The whole earth has about 135 per year over magnitude 6. Assuming the same ratio to hold for those below magnitude 6, about 500 to 1,000 per year should be between magnitude 4.25 and magnitude 6, in U. S. S. R. and China.

Using the equation $\log E = 9.4 + 2.14\,M - 0.054M^2$ it would require an explosion of about 1,000 kiloton to produce a magnitude of 6.

BEERS. The observed natural earthquakes in selected portions of

U. S. S. R. and China as published by Gutenberg and Richter, Seismicity of the Earth (Princeton, 1949), show the number of shallow, intermediate, and deep earthquakes per annum to be so small as to be negligible in this problem, excepting for well-known seismic belts of limited extent in the target area. The location of a nuclear underground explosion within these belts would constitute the best camouflage available from the target area, but in my opinion it would not constitute an important reduction in the probability of successful detection under Rainier conditions. The Gutenberg-Richter formula relating magnitude to energy shows that magnitude 6 would result from an explosion of about 44 kilotons under the stated Rainier conditions.

BENIOFF. See reply to 18.

CARDER. Of magnitude 4.25, probably hundreds a year; of magnitude 4.25 to 6 probably 200 a year; of magnitude 6 or higher, probably 50 a year. A magnitude of 4.25 earthquake is usually felt several miles from the source. The Rainier explosion was not perceptible by the senses 2 miles away.

DONN. All this information is available in Gutenberg and Richter, The Seismicity of the Earth.

EVERNDEN. No answer.

EWING. See the reply of Dr. Jack Oliver.

GUTENBERG. There are roughly 200 shocks in the Pacific belt of the U. S. S. R. per year and perhaps 100 in the interior of the U. S. S. R. and China with magnitudes of 4¼ to 6. There are roughly 20 earthquakes annually in the Pacific belt of the U. S. S. R. and perhaps 5 inland and in China of magnitude 6 or more. However, one has to consider the fact these are average annual numbers. There are great changes from year to year and in some years all these numbers may be appreciably higher a few times than those given above, while in others the number may be extremely small.

The question, "What size explosion would produce a magnitude of 6?" cannot be answered correctly. The magnitude scale is designed for earthquakes in which longitudinal, transverse, and surface waves are excited. In explosions most of the energy goes into longitudinal waves, so that the magnitude scale does not apply even approximately to artificial explosions. If a magnitude is given for an artificial explosion it means only that it has longitudinal waves of about the same size as an earthquake of the same magnitude.

HASKELL. From data given by Gutenberg and Richter in Seismicity of the Earth it appears that about 4.3 earthquakes per year of magnitude 6 or greater can be expected within the combined area of the U. S. S. R. and China. Direct data on smaller magnitudes is lacking, but if the world average of increase in numbers with decreasing magnitude is extrapolated down to a magnitude of 4.25 it appears that about 140 earthquakes of magnitude between 4.25 and 6 should occur per year in this region.

If Rainier is taken as the standard, an underground explosion of 1,000 kilotons should be equivalent to a magnitude of 6. However, Rainier was fired in a rather soft and porous volcanic rock in which the efficiency of the conversion of explosive energy into elastic wave energy may have been less than it would be in a more compact medium. If, under some circumstances, the conversion factor might be as much as 10 times as it was for Rainier, 100 kilotons might result in a magnitude of 6.

HEINRICH. I do not have these data immediately available, but some evaluation could be made from various earthquake studies in the literature.

HEROY. Between 1,000 and 2,000 earthquakes of magnitude 4.25 to magnitude 6 occur annually in the U. S. S. R. and China.

Between 10 and 20 earthquakes of magnitudes larger than 6 occur annually in the U. S. S. R. and China.

Assuming that the third question applies only to underground explosions, I do not have enough information to answer the last part of the question.

HOWELL. Offhand, I do not know the answer to this. Professor Beno Gutenberg at the California Institute of Technology, in Pasadena, is the leading world authority on magnitude. Earthquakes with magnitude 4.25 to 6 are quite common throughout much of Asia including both Siberia and China. I know of no disturbances other than earthquakes and nuclear explosions which would produce a disturbance of magnitude 6.

KNOPOFF. The reference for this question is again Gutenberg and Richter (op. cit.). They cite activity in the Crimea and the Caucasus (p. 68), a shock of magnitude 6 in the Urals (p. 242), and much activity in the Kuriles, Sakhalin, and Kamchatka area (p. 57). China has great activity (pp. 67, 73) from strong, shallow earthquakes. Szechuan, Tibet, Mongolia, and the Lake Baikal area are all active (pp. 207–209, 241–242). Further, on page 88, the above authors state, "Minor earthquakes occur almost everywhere. Practically all existing seismological stations have recorded local earthquakes in their immediate vicinity."

LEET. No answer.

LEPP. I am not sufficiently familiar with the details of earthquake distribution to answer this question exactly. However, the fact that earthquakes are highly localized within certain unstable belts should be an important consideration in evaluating the soundness of seismic detection systems. Vast stretches of Russia constitute stable shield areas and are, normally, earthquake free. Here, detection of blasts over 1 kiloton should be relatively easy. In the unstable Pacific Belt or in the trans-Himalayan region there would be more work in distinguishing between earthquakes and blasts because of the relative abundance of earthquakes.

LINEHAN. No answer.

LYNCH. I would have to consult International Seismological Summary or Gutenberg or Strasbourg Bulletins to answer parts 1 and 2. Comparisons are odious is the best answer to part 3. On available data at least 10^{20} ergs.

MURPHY. Natural earthquakes in U. S. S. R. for magnitude—

4.25 to 6: 300 per year.

6 or higher: 75 per year.

NUTTLI. I do not know how many earthquakes of magnitude 4.25 to 6 or greater than 6 occur annually in the U. S. S. R. and China. However, such information is not secret, and it could be found in the scientific literature of those countries.

I cannot say what size explosion would produce a magnitude of 6, because little information has been released concerning the energy of these explosions.

OLIVER.

Magnitude	In U. S. S. R. and nearby offshore areas	In China
4.25 to 6	About 100	About 500.
6	About 20 to 50	About 50–100.

POULTER. Depends on coupling to ground. Roughly about 100 kilotons.

The Rainier shot corresponded to a Gutenberg-Richter magnitude of 4.6, as determined from the stations located between 110 and 350 miles from the test detonation. An earthquake of this magnitude will produce perceptible vibrations of the earth's crust at a distance of 60 miles from the epicenter. However, I was at the observation point 2½ miles away from the Rainier shot and did not, myself, feel any ground motion, even though I was watching for it and knowing when it would arrive. Some observers believed they did feel it, but it certainly could not have been detected if one did not know when to expect it. This leads me to believe that this effect, combined with the difference in the seismogram close to as compared to those obtained at much greater distances, provides the most important aid in identifying an underground explosion by seismic means.

I have no information on the number of earthquakes of the various magnitudes which do occur in the U. S. S. R. and China, but the figure must be enormous.

PRESS. This is a question of earthquake statistics and has a definite answer. The research necessary to answer this question need only be done once, and I endorse Professor Richter's numbers.

RAITT. See answer to question No. 3.

RICHTER. As the originator of the magnitude scale, I must point out that it was not devised to apply to explosions at or near the surface, but to natural earthquakes originating at depths of 10 miles or more. Assignment of magnitude to an explosion has two possible meanings:

(*a*) The explosion produces deflection on a seismograph at a given distance from the source, equal to that produced by an earthquake of the named magnitude at a station equally distant from its epicenter. This is the significance of the magnitude 4.25 quoted in connection with the Rainier explosion. (Note that 4.25 should be read as 4¼. Magnitudes are not assigned to hundredths.)

(*b*) A magnitude figure may be obtained by comparing the energy of explosion with that calculated for an earthquake of given magnitude. This method is unreliable, owing to present uncertainties in the calculation of earthquake energy.

Statistics requested involve difficult estimation. I have used data from Seismicity of the Earth and from recent Russian publications. Statistics for magnitude 6 and over are fairly complete; but for lower magnitudes they are fragmentary. Many earthquakes of magnitude as low as 4.25 probably escape attention. Some are not reported by the stations which record them. Others, while reported, are recorded so imperfectly that their location is doubtful.

In giving average annual statistics it is necessary to exclude the numerous aftershocks of large earthquakes. An earthquake of magnitude 7½ or over is likely to be followed by 100 or more aftershocks

of magnitude over 4.25 within a year. Excluding such occurrences, I would estimate, for magnitudes 4.25 to 6 inclusive:

	Annually
U. S. S. R., excluding Kamchatka and Kurile Islands	25
Kamchatka and Kurile Islands	200
China	20

For magnitudes over 6.0, records since about 1903 indicate:

	Annually
U. S. S. R., excluding Kamchatka and Kurile Islands	3
Kamchatka and Kurile Islands	20
China	1 or 2

I estimate that it should take an explosion of 500 to 1,000 kilotons to write seismograms comparable with those of an earthquake of magnitude 6.

ROMNEY. Preliminary estimates from seismograms from a few stations indicated that the Rainier shot was equivalent to a magnitude of 4.6. This has since been corrected to a magnitude of 4.25. Gutenberg has estimated in the Quarterly Journal of the Geological Society of London, volume 62, that 6,200 earthquakes per year occur between magnitude 4.3 and 6.1. Since approximately one-sixth of the world's major earthquakes occur in the U. S. S. R. and China and nearby oceanic areas under the control of the Communists, I estimate there would be about 1,000 events per year in the magnitude 4¼ to 6 range which an inspection system would have to deal with. This estimate includes aftershock sequences of large quakes. Similarly, approximately 15 events per year occur in the same areas for magnitudes of 6.2 and greater. In this connection, it is of interest to note that more than 400 earthquakes of magnitude greater than 6.0 have occurred in the Kamchatka area alone since 1952. Since scaling laws for large explosions have not been established experimentally, it is very difficult to estimate the size of a blast necessary to produce a shock equivalent to a magnitude 6 earthquakes. However, assuming the same fraction of energy goes into the ground as was estimated from the magnitude determination on Rainier (one two-hundredth of the total energy), Gutenberg's estimate of the relation between magnitude and energy would imply that a megaton shot is required to produce a magnitude six earthquakes. However, some information from conventional high explosives suggests that this estimate may be too pessimistic and that a 40 kiloton explosion will suffice to produce a magnitude 6 shock.

SLICHTER. No answer.

TOCHER. No answer.

TUVE. No answer.

WALTER. (*a*) Possibly 50.

(*b*) Possibly 15.

(*c*) Approximately 2 megatons.

WILSON. A good many earthquakes of magnitude 4.25 to 6 occur in the U. S. S. R. and China. I will not attempt to make estimates as rather good information is probably available from others. As to the size of explosion that would be necessary to produce a magnitude 6 earthquake, I can only hazard a guess, but it would probably be on the order of 100 kilotons, which, of course, would be almost impossible to contain underground.

WORZEL. I know little of the seismicity of Russia or China, but on the basis of similarities to other areas, I'll judge that there might be

100 to 200 magnitude 4.25 to 6.00 earthquakes in U. S. S. R. and perhaps 400 in China. Probably 30–40 magnitude 6 would be observed in the U. S. S. R.

13. To what extent is it easier to detect a nuclear explosion underwater than underground?

BAILEY. A nuclear explosion underwater produces compressional waves in the "sofar" layer of the ocean which then carries to great distances (several thousand miles) with low attenuation. If a bubble of radioactive material rises to the surface from the nuclear explosion, this may be monitored with presently existing equipment.

BEERS. If buried at equivalent depth, detection of underwater nuclear explosions should be accomplished as easily as underground, other factors being equal.

BENIOFF. No answer.

CARDER. If Rainier is a criterion of an underground explosion, an underwater explosion is much easier to detect. If in deep water, there is no question in recognizing it as such because of peculiar afterwaves. If in shallow water, characteristics are nearly the same as an underground explosion except the underwater explosion has better coupling and shear waves are relatively smaller.

DONN. No answer.

EVERNDEN. See below.

EWING. See the reply of Dr. Jack Oliver.

GUTENBERG. It is much easier if the explosion is underwater.

HASKELL. The ocean forms a highly efficient low-loss channel for the propagation of compressional waves. Even the smallest underwater nuclear explosion should be detectable by suitable underwater microphones placed at any points where the propagation path was not obstructed by a large land mass.

EVERNDEN. I am quite certain that the detection of underwater explosions would be very easy, I have seen the record obtained at Berkeley of the Navy nuclear explosion off the coast of California. This record had nothing in common with an earthquake record and was quite obviously of explosive origin.

HEINRICH. I have little experience with seismograph recordings of underwater nuclear explosions at close distances. The presence of characteristics promoted by the water layer (such as excitation of T phase) might assist recognition.

HEROY. This is an ambiguous question. If an underwater nuclear explosion is meant, it may be easier to detect such an explosion than an underground explosion. If the question refers to the location of the detector, underwater or underground, I have no information.

HOWELL. Only to the degree that it is easier to record waves in the ocean. The oceans are a single medium of uniform composition whereas the ground is a much more complex medium.

KNOPOFF. No answer.

LEET. The coupling to ground is generally more efficient, so smaller explosions send seismic waves to greater distances.

LEPP. No answer.

LINEHAN. Depending on the depth at which the explosion took place, the amount of energy transmitted is usually greater under water. The surface waves have different appearances than those from an underground shot.

LYNCH. This question is ambiguous. Is the source or the receiver referred to as under water?

MURPHY. I do not have information about relative energy obtained from nuclear explosions under water and under ground.

NUTTLI. I do not know the answer to this question.

OLIVER. It is much, much easier, not only to detect, but to identify a nuclear explosion fired at some depth in the sea because of the following:

1. Seismic waves of large amplitudes are excited because of good coupling with the water. Waves apparently from the atomic explosion of Operation Wigwam off the coast of California were recorded all over the world.

2. The compressional and shear types of body waves have a unique and characteristic appearance which would not be confused with the same waves from an earthquake.

3. The seismic surface wave train includes modes and portions of modes not observed when the source is an earthquake.

4. In addition to the seismic waves, a sound wave (T-phase) of great amplitude is set up in the water.

5. I believe that gravity waves are also set up in the water.

POULTER. Underwater nuclear explosions would be very much easier to detect than underground shots.

(*a*) In the first place, an underwater nuclear shot, unless it is very small and extremely deep, cannot be completely contained, and some radioactivity would get out into the atmosphere.

(*b*) Considerable radioactivity could be detected in the water in the immediate vicinity for a short period after the shot.

(*c*) If it were in the open ocean, the sofar channels should pick up and record meaningful signals. This would not be true if it were in an area well shielded by land masses.

(*d*) If it were on the botton and its location were accurately known, it could probably be detected by letting instrumentation down into the immediate area.

(*e*) If the shot point were not too well protected by land masses, it should be possible to detect the tidal-wave effect for considerable distance in calm seas.

PRESS. A nuclear explosion in shallow water, if the explosion is completely tamped, would be equivalent to an underground explosion. A nuclear explosion in deep water would be much easier to detect because of the efficient propagation of sound in the ocean. Deep hydrophones in the ocean could readily detect even the smallest nuclear explosions detonated in deep water.

RAITT. A nuclear explosion is more easily detected underwater than underground, first because a greater fraction of explosive energy goes into seismic waves and second, the very good propagation of sound through water gives an additional means of detection.

RICHTER. The underwater explosions at Bikini in 1946 and off California in 1955 were more effective in transmitting energy into the earth than the Rainier underground explosion. The one off California was recorded at very distant stations.

ROMNEY. Water appears to be a very effective medium for tamping explosions, according to experience with small chemical explosions. It is probably more effective than most earth materials although there

are no cases known of an underwater and an underground explosion of equivalent yield so that there are no direct comparisons for nuclear size blasts.

SLICHTER. No answer.

TOCHER. The underwater atomic explosion fired off the coast of Lower California on May 12, 1955, wrote a unique series of records on the University of California seismograms. Transmission of energy in the sofar layer of the ocean was so strong that several persons along the coast of California reported feeling an "earthquake." (At Big Sur, Santa Cruz, and at sea off the Golden Gate.)

TUVE. No answer.

WALTER. I am not aware that this is so.

WILSON. I have no information bearing directly on this question, but I would suspect that it might be considerably easier.

WORZEL. It is apparently very much easier to detect a nuclear explosion under water than under ground as evidenced by the observations from operation Wigwam. This shot was recorded by stations all over the world and contained waves not observed in earthquakes or underground explosions.

15. If there were a worldwide suspension of nuclear weapons tests down to and including the level of 1 kiloton, at what locations throughout the Soviet Union and China as well as in other areas of the world where clandestine tests might take place should seismic stations be established in order to assure the maximum probability of detecting a violation of the test moratorium? What total number of seismic stations would be required? What would be the personnel requirements of this system? What percentage of the earthquakes normally occurring in these regions could be correctly identified? What is the probability of an explosion being incorrectly identified as an earthquake? How long would it take to install such a system? What type of seismometers would you recommend to be used? What would you estimate the cost of the system you have described? Would such a system be capable of identifying an underground explosion as a nuclear explosion?

BAILEY. Stations should be placed 50 to 100 miles apart in highly seismic areas, such as Kamchatka and the Kuriles. Wider spacing is justified in areas of low seismicity. Station sites should be pretested, if possible, to find the most quiet location. Perhaps 100 or 200 stations would be sufficient for the accuracy of determination required. Perhaps 300 to 600 men would be required to operate and maintain these stations. Over 95 percent of the earthquakes would be correctly identified merely by calling every seismic event an earthquake because the number of earthquakes in active seismic areas is much larger than the number of explosions, even during an intensive test program. With 50 to 100 miles separation, contained underground explosions could be hidden in highly seismic areas such as Kamchatka.

The length of time required to install a surveillance system would depend upon the number and type of instruments at each station, manufacturing facilities available, trained personnel available, et cetera. Perhaps 2 years would be a reasonable estimate.

Matched three component Press-Ewing long period and short period Benioff instruments should be installed at each station to check the

energy ratios between P and surface wave groups, and make first motion determinations. The ultrashort period seismic level recorder of University of Michigan Engineering Research Institute shows great promise but needs more development and testing. The cost would be in the neighborhood of $100,000 per station, including buildings and instruments.

A net such as this could identify explosions but not nuclear explosions as such. It would be highly probable that any explosion with over one megaton of energy would be nuclear.

BEERS. It seems impossible to answer this question properly without revealing a knowledge of information which in itself is classified information. The answer is probably available from one or more agencies of the United States Government. Under appropriate security this question could be more fully answered.

BENIOFF. If a suitable monitory network of seismic stations can be established it is my opinion that underground explosions of the size of Rainier in Nevada and possibly substantially smaller ones can be successfully detected. The validity of this conclusion is limited by my lack of certain existing observational quantitative information.

Inspection of a world globe shows that an adequate network requires stations located in Canada, Alaska, the Aleutians, Greenland, Iceland, Spitsbergen, northern Scandinavia, Germany, Italy, Greece, Cyprus, Israel, Turkey, Pakistan, India, Hong Kong, the Philippines, Formosa, Japan, Korea, and other more distant but less important sites, as well as Iran, Iraq, and Afghanistan, if these countries are sufficiently friendly. The cost of such a network would be of the order of a hundred million dollars plus upkeep.

CARDER. (*a*) Stations spaced 600 miles apart in nonseismic areas, i. e. on the Siberian Shield; and 200 miles apart in seismic areas such as Kamchatka and Turkestan, and 400 miles apart elsewhere, or (*b*) a total of about 100 stations would be needed to detect a 1 kiloton underground explosion anywhere in the Iron Curtain area. (*c*) Personnel requirements are at least two men at each station together with a central staff. At least 250 men would be required. ((*d*) and (*e*) as in 8.) In a seismic area nearly all natural earthquakes would be identified and probably 20 to 30 percent of explosion records would be incorrectly identified as earthquakes. In nonseismic areas probably 75 percent of earthquakes would be identified as such and 10 percent of explosion records incorrectly identified as earthquakes. (*f*) The system would require 1 year at least to implement after all specifications were in and finances assured. Simultaneously a year would be required to install stations and set up and train headquarters staff and operation personnel. In all, at least 2 to 3 years would be required to place system in operation after final approval is given. (*g*) I would recommend a 3 component Benioff type short-period moving coil as used at several Coast and Geodetic Survey stations but of a higher quality and a 3 component long-period seismograph of the Press type at each station. A preliminary study of surface waves on records from the latter type seismographs to attempt diagnosis of underground versus earthquakes should be made. This has barely started. (*h*) The total cost would be ten to twenty million dollars per year for the first 2 years and probably eight to ten million dollars per year thereafter. If immediate diagnosis is necessary cost

would be somewhat more than this. (*i*) At this time an instantaneous HE (high explosion) and a nuclear explosion of the same kiloton range probably could not be distinguished except that a legitimate HE should produce surface effects that are open for inspection.

DONN. No answer.

EVERNDEN. On detailed costs of a detection system, I can contribute nothing, but I would say that the indicated costs for detecting 1-kiloton shots would be prohibitive.

EWING. See reply of Dr. Jack Oliver.

GUTENBERG. The more the better; especially in earthquake regions the stations should not be much over 100 miles apart. With short period highly sensitive electromagnetic type vertical and horizontal instruments all shocks down to magnitude 3 or even less could be located. The blasts usually show relative to the longitudinal waves much smaller transverse waves as indicated above, but decision, if it is an earthquake or a blast, would not be absolutely certain. I do not know details of nuclear test records. For small explosions, confusion with small earthquakes is certainly possible. I have no data from which I could answer the question whether a system would be capable of identifying an underground explosion as a nuclear explosion.

HASKELL. If the "pessimistic" estimate of a 550-mile identification radius is accepted and it is required that all points within the U. S. S. R. (including adjacent Arctic islands) and China be within 550 miles of at least 3 seismic stations, it would require about 73 stations distributed at 550 mile intervals to give complete coverage of the area. If the "optimistic" estimate of 1,100-mile identification radius is accepted, the number of stations required would be reduced to about 26.

I do not feel competent to estimate the personnel requirements of such a system without an extensive study of the possibilities of unmanned operation of many of the more remote and inaccessible stations, employing radio data transmission to a smaller number of master stations where data recording and preliminary processing would take place. The same remark applies to cost.

With the 1,100-mile station spacing suggested above as "optimistic" I would suppose that 90 percent or more of all earthquakes of magnitude 4.3 or greater occurring in these regions would be correctly identified. With the 550-mile station spacing earthquakes down to a magnitude of about 3.7 could be identified with a similar reliability. With regard to the probability of an explosion being identified as an earthquake see 7 above.

I would suggest that each station be equipped with 3-component short period Benioff seismometers for body wave identification and also 3-component long period seismometers of the Columbia University type for surface wave identification.

The system would not distinguish between nuclear and chemical explosions.

HEINRICH. To obtain this answer would require a study of the points listed in answer 3 above.

Only these data would permit an operational and cost evaluation of such an interpretative detection network.

I do not have sufficient data for a reasonable evaluation.

HEROY. In order to insure a maximum probability of detecting violations by seismic means, seismograph stations should be established every 8 to 10 degrees of arc (500–700 miles). For the Soviet Union and China, and other land areas where clandestine tests could take place, 40 to 50 stations would be required. For the rest of the land area of the world, part of which is already covered, another 50 to 60 stations would be needed. Even so, large oceanic areas in which tests could be made clandestinely would not be adequately covered. This means a total of 100 or more stations would be needed for world coverage. It is anticipated that many existing stations would contribute data to support this new network.

The personnel requirements for each station would be a minimum of five technical people with their capability divided between seismology and equipment operation and/or maintenance. In addition, a comprehensive study of all seismograms should be made in a laboratory for seismological review. It is possible that such a laboratory would require as many as 250 people, many of whom would need to have a high degree of capability.

It is expected that 95 percent of the earthquakes normally occurring in the Soviet Union and China could be correctly identified by such a system. The rest of the world would probably not all be covered.

I estimate a 10-percent probability that an explosion would be incorrectly identified as an earthquake. This is not a meaningful figure in the light of our present state of knowledge.

On a crash basis, a worldwide system of stations could be set up and running in 2 years' time. This would be a major undertaking.

The basic equipment in a surveillance system should be short-period instruments with extremely high gain and precise timing. The best combination of instruments would be a variable-reluctance, three-component system using phototube amplifiers and film recorders. Supplementary equipment could include long-period instruments, in the 30-second range.

It could be expected that the cost of setting up 100 well-equipped seismograph stations, half within the Soviet Union and China, would be $25 million to $50 million. I think that it would take a similar amount to operate such a system each year.

In my opinion, such a system would not be capable of identifying an underground explosion as a nuclear explosion.

HOWELL. It would be impossible to detect very small nuclear explosions. This would require a network of seismometers every 100 miles on a square grid network. I do not believe it would be practical to try and locate any test except large nuclear tests. These would require a network of perhaps every 500 to 1,000 miles. There are probably a million natural earthquakes in the world per year. I do not believe it would be practical to watch nuclear explosions of magnitudes smaller than 3 to 4, as the number of disturbances is so very large. There are probably on the order of magnitude 10,000 earthquakes annually of magnitude 4 or greater. This will give some idea of the difficulty of watching for nuclear explosions with earthquake sensitive apparatus.

KNOPOFF. I would extravagantly suggest a grid of stations 50 miles on a side. If taken over the entire area of the earth, this would require 20,000 stations. Taken over the area of the Soviet Union and China, this would require about 5,000 stations. These stations,

studying first motions, could probably determine sites and discriminate between earthquakes and explosive sources in a majority of cases. Short-period seismometers should be used. No discrimination between types of explosive sources would be possible.

The reliability of such a system would probably still be quite good if the grids were increased to 100 miles on a side, reducing the number of stations by a factor of 4. The response would be, of course, poorer.

The above number of stations is, of course, not a practical one. However, first motions can reliably be detected out to about 300 miles or so for 1 kiloton, although with reduced epicenter resolution. At a grid spacing of 300 miles, or about 100,000 square mile coverage per unit of the net, the number of stations required to cover the area of the Soviet Union and China is thus about 100 stations.

Taking into account irregularities of border, about 150 seismic stations, equipped with short period seismographs, adapted to the problem of the detection of first motions should handle the problem. At this spacing, the epicenter resolution would probably be of the order of 10 miles or so. "On the spot" detection to locate foci in 100 square mile regions is, of course, most difficult.

LEET. We have at this station an all-out research program in the planning stage some objectives of which would have to be attained before this question can be answered. I don't believe the question can be answered at this time.

LEPP. No answer.

LINEHAN. The total number of stations required, their location, the personnel requirements, etc., could only be determined after suitable testing to determine the best type of instruments to use, the range of these instruments, etc. As the instrumental range increases, then the number of stations required could be decreased. With an accumulation of test records, then methods could be developed that might raise the percentage of accuracy in determining that a disturbance is nuclear.

In our present state of knowledge it is quite impossible to give definite answers to some of these questions.

The cost of a station installation, exclusive of personnel salaries, but including a small building, developed instruments, accurate clocks, accurate cyclage, and voltage controlled power supply, might be about $150,000.

LYNCH. As many small concealed seismometers as possible should be set within 600 miles of all likely clandestine testing sites. The recording of these seismometers could be done miles away. No personnel would be needed at the seismometer site. Both earthquakes and explosions would be recorded without fear of their being confused. Small seismometers of the Willmore type would seem practical. More thought is needed for a fuller answer to this most practical question of the whole questionnaire.

MURPHY. (*a*) At the present time sufficient information is not known for distance ranges over which good recordings can be obtained from nuclear explosions. The Rainier blast (1.7 kiloton) was recorded poorly up to distances of 2,300 miles by conventional seismographs. By the use of special type seismographs and special analysis of the records, recordings for the recent Ripple Rock explosions (2,673,000 pounds of Nitromix) were obtained from distances of 1,700 miles and approximately 3,000 miles. (*b*) If we assume a minimum energy of

1 kiloton there would be need for approximately 100 stations. This total might be reduced if many of the existing 450 stations in the world could be used in this program. (*c*) Personnel required: there is a question as to whether the stations could be operated by our scientists or by local scientists supervised by United States seismologists. Using the latter method, it is possible for a small group of United States scientists to manage a number of stations by periodically visiting and analyzing the seismograms. All records would be collected and filed under United States control. (*d*) and (*e*) As in reply 8. (*f*) At least a year would be required for construction and delivery of instruments to the chosen sites, training of personnel and installation of equipment will require a year to 2 years; a good 2 years will be required to make the system operative. (*g*) Seismometers recommended would be the Benioff and possibly special geophysical types with special recordings (for final decision more information is needed about improvement of instrumentation). (*h*) Cost of system: To organize and establish, 10 to 12 million dollars; to maintain and improve after original system is established, $8 million per year. (*i*) This system could not identify an underground explosion as a nuclear explosion unless the ground was blown out and other means could be used to detect radioactivity.

NUTTLI. I cannot give the exact number of earthquake stations required to locate any clandestine tests in the U. S. S. R. and China because I do not know the greatest distance at which waves from a 1-kiloton explosion can be used to locate the source. Assuming that this distance is approximately 300 miles, it would require approximately 200 seismograph stations located in these countries. The seismometers to be used should be sensitive electromagnetic ones, with a natural period of about 1 second. Suitable seismometers would be the Reeff (used at St. Louis University), the Benioff, or the Willmore.

I do not feel qualified to answer the remaining questions of this section.

OLIVER. I would accept the estimates on this from the Government sources with which I am familiar. (See question 1.)

Eighty to ninety percent of the earthquakes would be correctly identified.

What is the probability of an explosion being incorrectly identified as an earthquake?

Perhaps 10 to 20 percent.

How long would it take to install such a system?

This would depend primarily on the logistics and cooperation of the country in which the site is located. Seismic equipment might be had in 6 months to 1 year.

What type of seismometers would you recommend to be used?

Benioff short-period seismographs. Long-period instruments of the type used by the Lamont Geological Observatory–IGY program and manufactured by Sprengnether and by Lehner and Griffiths.

What would you estimate the cost of the system you have described?

Rough estimate $50 million to $100 million.

Would such a system be capable of identifying an underground explosion as a nuclear explosion?

Only if the explosion were larger than could be built up from conventional explosives.

POULTER. Even if it were economically and physically possible to establish such a system of seismic stations and their associated computation centers, when one considers the drain on trained personnel, the vast amount of data they would have to sift in proving the legitimacy of an enormous number of earthquakes, and then contrast with this the remoteness of the possibility of identifying an underground explosion as a nuclear explosion, the cost would seem to be completely out of proportion with the results than one could expect.

Rather than setting up a system of stations that would blanket the countries of interest, it would seem to be much more to the point to establish a comparatively small number of strategically located stations capable of shifting without notice. It would seem that such a system of mobile units which could be set up at a small percent of the cost and manpower would be an even greater deterrent than the unwieldy static system.

PRESS. Seismic stations will of necessity be established to assure the maximum probability of detecting a violation of a test moratorium. One hundred seismograph stations over an area the size of the Soviet Union would be required in my opinion. Of the order of 100 full-time people and 50 to 100 part-time people (working less than 1 hour a day) would be needed to tend 100 seismograph stations.

Probability of an explosion in the 20-kiloton or larger class being incorrectly identified as an earthquake is less than 5 percent, in my opinion.

It would take 1 to 2 years to install such a system after the apparatus has been delivered by the manufacturer.

I would recommend the use of the most sensitive short-period seismographs, such as arrays of short-period Benioff seismographs or the equivalent, as well as long-period seismographs with matched E–W, N–S and vertical components. The Press-Ewing instruments operated at 10-second periods would perform adequately for the long-period instruments.

The cost of this system per hundred seismograph stations would be of the order of $10 million.

This system could not distinguish between an underground chemical explosion and nuclear explosion.

RAITT. The answers to these questions depend on the answers to questions 3 to 12, and my opinion is unimportant for the reasons stated above. However, from the little I know of the Rainier test, I think that with present methods the detection range for inspection purposes is hundreds rather than thousands of miles. This would require the order of 1 to 10 stations per million square miles of inspected area. As the combined area of U. S. S. R. and China is about 12 million square miles, roughly 100 stations, evenly distributed, would be required. The effectiveness of this system could be learned only through use, and as the testing of nuclear bombs presumably will have ceased prior to the setting up of the network, it might be difficult to ascertain the safe minimum number of stations required. In any case, it would be desirable to gain some experience with widely spaced stations before final choice of the ultimate number is made.

RICHTER. Seismic stations should be spaced not over 500 miles apart in critical areas, particularly where natural earthquakes are frequent.

Personnel should include 1 regular attendant at each station, plus maintenance crews operating out of bases serving 5 to 7 stations each. Rapid communications should be provided to correlate recordings for all stations at an international headquarters. With efficient operation, detection should gradually improve to nearly 100 percent, as a result of identifying persistent earthquake sources and becoming familiar with their characteristics.

Highly sensitive seismometers, of both high-frequency and low-frequency characteristics, should be installed at each station.

Possibility of identifying nuclear explosions as such depends on the proper answer to question 10. Note, however, that there should be no obstacle to obtaining information on nonnuclear explosions.

I am not familiar with present costs. However large the program, its cost should be much less than that of continuing bomb tests.

ROMNEY. For detecting tests in the Soviet Union and China, approximately 50 stations would be required. These would be most densely distributed in seismic areas since any shock originating in seismic regions would be immediately suspected of being manmade. Each station would require 2 to 12 technicians, depending chiefly on how rapidly the results are required at a central analysis center. The analysis center, in turn, would require approximately two men per field station.

The extension of the system to include the entire world is not feasible for detecting 1-kiloton tests, because of the vast regions of the earth which are covered by water and are therefore unsuitable for seismographic stations. The existing network of seismographic stations both within and without the U. S. S. R. would be of assistance in this connection, but many additional stations would certainly be required chiefly in the Southern Hemisphere.

Of the order of 90 percent of the earthquakes occurring in Communist-controlled territory could be identified by such a system. In other parts of the world, a much smaller percentage would be identified and it seems probable that most shocks smaller than the equivalent of 10 kilotons would be unidentified.

With the network proposed, there is a 10 to 20 percent chance that an explosion might be incorrectly identified as an earthquake. The evidence for this is chiefly the seismograms from Rainier, where it was found that a number of stations more distant from 250 miles recorded first motions which would probably be interpreted as rarefactions, leading to the earthquake interpretation.

Approximately 2 years would be required to install such a system even if the program was given the highest priority. I would recommend that each station be equipped with 3-component long-period seismographs and arrays of perhaps 20 short-period vertical seismographs. A crude estimate of the cost would be $50,000 per station for technical equipment alone. This system would not identify an underground explosion as a nuclear explosion independently of other forms of intelligence.

SLICHTER. See reply to 7.

TOCHER. No answer.

TUVE. I believe that a modest array of inspection stations in each country would permit the detection of all explosions larger than 500 or 800 tons TNT equivalent, but that identification as specifically

a nuclear blast, especially if underground, might require access to the suspected region.

WALTER. A relatively closely spaced network of seismic stations through the areas under surveillance based on a grid system of 250 miles per unit grid should be able to record and detect underground explosions. If we assume that locations could not be made inside Russia and Russian-controlled areas, seismic stations should be established in the adjacent seismically stable areas such as North Africa, Arabian, India, Malay Peninsula, Greenland, Arctic region north of Europe, in addition to stations throughout the rest of the free world.

(*b*) This might require as many as 100 seismic stations.

(*c*) See 7 (*c*).

(*d*) See 7 (*c*).

(*e*) Possibly 1 year to 2 years.

(*f*) High sensitivity instruments of the Benioff type, both long and short period, horizontal and vertical components.

(*g*) From $5 million upward. This does not include operation and maintenance.

(*h*) Very doubtful.

WILSON. I do not feel competent to answer this question with my present state of information. I would guess that it would take a rather large number of stations. From my answer to question 3 it is evident that a gridwork of stations on a spacing of not less than a few hundred miles would be necessary, which I would think would almost make such a system impractical. The personnel requirements of such a system would be enormous, and all the problems raised earlier of properly identifying earthquakes and explosions would exist. As I have indicated earlier, in the present state of the art I would doubt if any such system is now capable of identifying with certainty an underground explosion as a nuclear explosion.

WORZEL. No answer.

16. In the system you have described in how many cases per year do you feel that the data from the system would leave unresolved the question of whether or not an underground explosion had occurred?

BAILEY. The number of cases per year which would go unresolved would be the number of earthquakes of magnitude appreciably greater than the largest nuclear test expected, assuming earthquakes are used for concealment.

BEERS. The answer to this question depends upon the extent to which an optimum detection system is realized in practice. As for question No. 7, the probability of detection can be calculated for a given set of parameters.

BENIOFF. No answer.

CARDER. I can't answer this question numerically. Probably 10 to 30 percent of nuclear explosions, if of a 1 kiloton range, would go unresolved. If of a higher yield, the proportion probably would be much less than this.

DONN. No answer.

EVERNDEN. No answer.

EWING. See reply of Dr. Oliver.

GUTENBERG. No answer.

HASKELL. Have no basis for estimation.

HEINRICH. I cannot give an estimate for lack of data.

HEROY. This depends upon the seismicity of the areas under surveillance. It might be anticipated that between 100 and 200 cases per year would be unresolved.

HOWELL. I do not believe any inspection system would work unless someone can go to the region where the earthquake is believed to have occurred and look for the effects. Even then it might be very hard to detect an underground explosion.

KNOPOFF. See answer to question 15.

LEET. See reply to 15.

LEPP. No answer.

LINEHAN. Perhaps less than 10 percent.

LYNCH. Very few.

MURPHY. It is difficult to guess just how many underground explosions would go unresolved. The percentage can be greatly reduced by inspection, i. e., by scientists and other visiting or inquiring about suspected activities.

NUTTLI. I do not know, since the answer to this question would depend upon the answer given in No. 12.

OLIVER. Five to twenty-five per year. This is a rough guess.

POULTER. Unless some means is found for remotely detecting underground explosions which is more reliable than seismic, it will be surprising if most of them do not go undetected.

PRESS. In my opinion earthquakes of magnitude, say 4½ and less, could not be differentiated from an underground explosion in the 5 kilotons or smaller class without provision for field inspection. Earthquakes of magnitude of about 5½ or larger, and explosions in the 20 kilotons or larger class could be identified with an uncertainty of less than about 5 percent.

RAITT. See answer to question 15.

RICHTER. This is not clear. How many times a year do you assume that someone will try to conceal a test?

ROMNEY. The system described might have a reliability of 95 percent in indentifying as natural earthquakes those shocks having energy greater than 10 kilotons. Unfortunately, most of the shocks would be of smaller size, equivalent to 1 to 5 kilotons. Since the reliability is a direct function of the signal size most small shocks would be less easily identified. My estimate is that, in Communist controlled territory, as many as 300 shocks per year would remain unresolved if shocks as small as 1 kiloton equivalent were considered. Outside of Communist territory, the number would be vastly larger—perhaps many thousands per year.

SLICHTER. No answer.

TOCHER. No answer.

TUVE. No answer.

WALTER. See answer to question 7 (*c*).

WILSON. No information not given above.

WORZEL. See answer to question 15.

17. Do you believe that on-the-spot inspection teams directed to the area defined by your seismic system could locate and identify evidence of an underground explosion? If so, do you believe that evidence of an underground nuclear explosion could be obtained by

such an inspection team? About what area in square miles would the inspection team be required to search for each event? What types of evidence would the inspection team find useful in identifying an underground explosion?

BAILEY. If the explosions were set off without effective earthquake interference, inspection teams could locate and identify evidence of an underground explosion by looking for evidence of recent activity and drilling for radioactive debris. This could be made very difficult for the inspectors by using long tunnels and preparing the shots well in advance of the explosion. In areas of deep permafrost, heat generated by underground explosion will thaw the earth markedly, reducing the electrical conductivity. This change may be detected from the nearby surface of the earth.

With a dense net of stations of high sensitivity and low interference an area of perhaps 25 square miles would require careful inspection.

BEERS. The answer to parts (*a*) and (*b*) is yes. The maximum size of the area to be explored would depend upon the capability of the detection system. As a general statement it may be said that the area to be explored would not be unreasonable in size.

BENIOFF. No answer.

CARDER. Yes to the first two parts. An HE should show outward signs if legitimate. If a clandestine explosion that did not blow out, I would suspect a nuclear explosion. If a blow out, debris would be radioactive, if nuclear. An area of 15 to 30 square miles would be required.

DONN. Possible radial fracture patterns might be observed. This pattern would be much more limited in radius than that from an earthquake.

EVERNDEN. If a shot is buried sufficiently deep, there will be no surface evidence of an explosion. The only evidence would be that due to activity in the area associated with preparation for the shot or for observing its effects. However, during a moratorium on such shots, observation of its effects would be impossible as this would certainly be detected by a police force. Being naive in these matters, I fail to see the utility of shots whose effects cannot be observed and investigated. The act of causing a seismic event will immediately focus attention on the epicentral area and further activity will be impossible.

EWING. See reply of Dr. Jack Oliver.

GUTENBERG. No answer.

HASKELL. For yields up to 100 kilotons and perhaps up to 1,000 kilotons it would appear to be entirely feasible to bring the shot deep enough to prevent any surface evidence of the explosion other than that left by the process of driving the access shaft or tunnel to the explosion chamber. The inspection teams would therefore have to search the suspected area for signs of mining or drilling activity and then drill to intercept the explosion cavity. Detection of high radioactivity in the bore hole would then establish the fact of a nuclear explosion. As indicated in 4, it is believed that a seismic network of the density suggested could locate the site of the explosion to within a radius of about 5 miles. An area of about 80 square miles would therefore have to be searched.

HEINRICH. No answer.

HEROY. This is not basically a seismic problem. Is there any surface evidence from Rainier? If the inspection team were equipped and permitted to drill holes, which seems unlikely, they could probably find positive evidence of an underground explosion and probably identify it as an underground nuclear explosion. Depending on the size and depth of the charge, there might be surface evidence of mining or hole-drilling operations, but these could probably be concealed beyond detection.

With present seismic traveltime curves, it is possible to make an epicenter location within a radius of 10 miles. This means that an on-the-spot team would have to cover an area of over 300 square miles for each suspected event. However, with a system of new stations, the traveltime curves could probably be refined to reduce this figure somewhat.

HOWELL. It would be very difficult to locate an underground source if a careful attempt had been made to conceal it. Such a source would have no evidence at the surface. Our own tests in Nevada proved this.

KNOPOFF. On-the-spot inspection teams would have to search areas comparable to the uncertainty in epicenter location; i. e., about 10 square miles. I do not know of any critical surficial evidence that could be used. The important feature is that the seismographic stations be near the sources and not at remote points thousands of miles away.

LEET. See answer to question 15.

LEPP. I believe that an on-the-spot inspection team could identify a blast area if given sufficient time. This may be accomplished by (*a*) radiometric measurements of the area, particularly of air in joints and other openings in rocks; (*b*) drilling and measurement of thermal gradient.

LINEHAN. Yes; an inspection team could be directed to the area. The size of the area to be studied would depend again, on the range of the instruments, the position of the recording stations, the type of explosion, etc.

LYNCH. Yes to part 1. No to part 2 and further thought to part 3.

MURPHY. First two parts of question answered in No. 16. The area depends upon the accuracy of the seismic epicenter, possibly 10 miles square. A blowout would simplify the inspection for any nuclear exposition because of radioactive accumulation.

NUTTLI. I do not know the answers to these questions.

OLIVER. For a small or moderately large explosion this would be very difficult if real efforts were made to hide the explosion.

About what area in square miles would the inspection team be required to search for each event?

About 10 square miles.

What types of evidence would the inspection team find useful in identifying an underground explosion?

A seismic reflection survey might help if done in detail. Drilling, of course, might be required.

POULTER. On-the-spot inspection teams directed by long-range seismic stations would spend most of their time checking on earthquakes which could probably never be identified. If an intermediate-

to long-range microbarograph system can be worked out to record disturbances transmitted through the air, then a seismic equipped on-the-spot inspection team would have a much better chance of success.

An on-the-spot inspection team would have great difficulty recognizing surface effects of even a large underground explosion from walking directly over the explosion point, particularly if the immediate surface had been otherwise disturbed in recent years and inspection from a low-flying plane would be meaningless.

The only positive evidence would be to drill or dig into the shot point and find the radioactive residue. This might take months even if they had the exact location. If the location were uncertain by a few hundred feet, as most likely would be the case, it might well be next to impossible to locate it.

PRESS. Provision for on-the-spot inspection teams directed to instrumentally defined epicenters would be a powerful deterrent against attempts at evasion. It is difficult, although not impossible, to remove evidence of tunneling and heavy machinery that would be necessary in preparing an underground nuclear explosion. An area of about 25 square miles may have to be searched for each event.

RAITT. I believe that an underground explosion of sufficient magnitude to be detected by the seismic system could be located and identified by an inspection team sent to the locality defined by the system. The error in locating the site may be a few miles. Hence, the area to be searched might be about 10 miles. It would be very difficult to dig the shaft or tunnel required and set up the necessary test facilities without leaving evidence detectable by an alert inspection team having free access to the area. The explosion itself should have some surface effects, unless it is several thousand feet deep, in which case the excavation would be even more difficult to conceal. Of course, this belief cannot enjoy complete confidence, for it is possible that concealment could be successful with sufficiently clever effort. However, the probability of detection would be so great that it is virtually certain that no country wishing to conceal secret tests would permit either the seismic system or inspection teams.

RICHTER. This involves techniques with which I am not familiar. Inspection organizations should use normal police and detective procedures as well as scientific instruments.

ROMNEY. I have no competence in this area. My belief is that a sample of fresh nuclear fission products is the only proof.

SLICHTER. No answer.

TOCHER. No answer.

TUVE. No answer.

WALTER. (*a*) Successful seismic detection by such a closely spaced network should pinpoint the epicentral location much more closely than specified in the answer to quesion 4 which assumes teleseismic recording or recording at a great distance. Under the conditions of this closely spaced seismic network, the location should be within ± 10 miles and the time ± 1 second. If all surface evidence in the epicentral region examined by the inspection team were negative, then various devices and techniques such as seismic profiling, gravity pro-

filing, electrical methods, measurement thermal gradients, core drilling, and radiation testing or core samples could be employed in this relatively small epicentral region.

(*b*) Such direct sampling as core drilling and radiation analysis of cores, and petrographic, physical, and chemical analysis of rock samples would definitely identify nuclear testing.

(*c*) An area of approximately 10 by 10 miles.

(*d*) Surface effects, such as fracturing of ground surface, radiation effects, comparative tests of rock samples, petrographically, physically, and chemically.

WILSON. This is a question on which I have no specific information.

WORZEL. See answer to question 15.

18. If you were given the problem of determining a set of conditions under which an underground nuclear explosion could be carried out without detection by the inspection system described by you in questions 15 to 17, what procedures would you suggest?

BAILEY. I would suggest setting up the nuclear device in a tunnel with any desired instrumentation in a highly seismic area, and then set a strong motion seismograph to trigger the explosion when an earthquake occurred in the vicinity which was of higher magnitude than the explosion of the nuclear device. The explosion would be effectively buried in the record of the earthquake.

BEERS. Considerations given for question No. 15 apply to this question.

BENIOFF. It should be emphasized, however, that no system of detection is absolute. Any station or group of stations can be rendered ineffective by strong local winds, by local microseismic storms, by sabotage, and by instrument failures. Moreover, a nuclear test, fired just after the occurrence of a nearby earthquake would be difficult though not necessarily impossible, to detect owing to interference on the seismogram from waves generated by the earthquake.

The Pamirs region of Turkestan is subject to rather frequent earthquakes and it is rather a remote possibility that in a test site situated there, explosions could be arranged to be triggered by an earthquake and thus be rendered less detectable.

Another possible way in which to render seismic detection difficult is to fire at a great height above the earth's atmosphere and thus greatly reduce the amplitude of the atmospheric waves which are themselves detectable and which can produce waves within the earth. This method has its obvious drawbacks.

CARDER. I would suggest finding a deep but dry alluvium-filled valley in a seismic area and conduct tests in unconsolidated sediments, but deep enough not to blow out, and above the water table if possible. conducting test explosions during an earthquake swarm would be an ideal time.

DONN. (*a*) Set up explosion in a highly seismic area.

(*b*) Use a region having a strong asymmetry or contrast in geologic structure.

(*c*) Use the waves from a natural earthquake to trigger the blast.

EVERNDEN. If I wished to explode a shot and to avoid detection, I would:

(*a*) shoot in a seismically active area and shoot during an aftershock sequence. This might seem too difficult to arrange

but the great numbers of Kurile and Kamchatka shocks make it not impossible;

(*b*) exploit the weaknesses of the detection system. The point would be to deprive the policing force the possibility of effective analysis of the seismic event;

(*c*) make the seismic records look as much like as earthquake records as possible. This would require an analysis of the real causes of shear energy in such shots as Rainier;

(*d*) minimize the development of radiated elastic energy. The site of the explosion would have a large effect on this; I do not know whether measures taken for shielding or absorption would be effective;

(*e*) attempt to confuse the police force by such things as shooting simultaneous shots so placed as to garble the records.

EWING. See the reply of Dr. Jack Oliver.

GUTENBERG. It would be best to use an earthquake region with very porous dry layers. During a period of microseismic storms (usually especially strong during the winter) it is more difficult to find traces of explosions or earthquakes than during quiet times (usually during the summer).

HASKELL. With the relatively short ranges probably required to detect and identify explosions down to the 1 kiloton level, most of the stations of the detection network would be on U. S. S. R. and Chinese territory and would therefore be vulnerable to jamming. For example, parties operating ostensibly as seismic exploration crews could be located near each of the stations of the network that might possibly be in positions to detect a given shot. Just before the earliest possible time of arrival of the seismic waves at each station these crews could commence firing a number of high-explosive shots, creating a high local noise level to mark the signals from the clandestine nuclear shot. The existence of coordinated jamming of this kind would, of course, create a presumption that a nuclear shot was being hidden, but there would be no data from which to determine an accurate location and obtain conclusive proof of the fact.

HEINRICH. After obtaining knowledge of the diagnostic characteristics of nuclear blast seismograms I would seek methods of confusing or distorting such seismograms, detonation at times of proper seismic background. Perhaps seismic noise might be generated in a confusing pattern.

HEROY. (1) Location to be in heavily wooded, highly seismic area;

(2) Location to be in area of normal mining operations so as to attract minimum amount of attention;

(3) An abandoned mine working might be a suitable location;

(4) Hole to be drilled instead of tunneled; equipment and supplies to be transported by helicopter rather than by roads built to the site;

(5) Any waste material from the excavation to be removed and dropped in nearby body of water or stored underground;

(6) Hole to be sealed with cement, using the cuttings in the mixture.

HOWELL. I would use an abandoned mine or a new shaft coming out in an old quarry or in a building near a river where the debris from the excavation could be dumped in the water without leaving a visible trace.

KNOPOFF. I would first study the possibility of constructing shaped nuclear charges; that is, charges which would be directional

in the way they release their energy, rather than omnidirectional, as I assume present nuclear weapons to be. Second, I would attempt to introduce baffles or some device so that if a nuclear explosion were shot toward the bottom of a deep interior, cavity, the ground wave striking the earth's surface might come in before the air wave through the cavity volume. There are some physical reasons why the second suggestion is not practical at the present. This is pure conjecture as I do not know whether studies upon shaping nuclear weapons have been made or are contemplated.

Shooting two or more charges side by side does not alter the main feature of a net dilatation source for an explosion or explosions, even if shaping occurs. However, stations close to the epicenter may receive misleading information and the date from remote stations would have to be used; for small shocks, remote stations would be too feebly excited to give useful information. I am certain that other evasive actions could be taken which do not come to mind at the present time.

LEET. See answer to question 15.

LEPP. I would set the explosion in an active seismic belt and, hence, increase the possibility of confusion with a natural phenomenon. I believe in most cases, however, such an explosion could be distinguished as a blast, providing that there were a widespread seismic network.

LINEHAN. If the explosive material were loosely packed and tamped, or if the geological conditions of the mine were such that they would cushion any shock then the energy might not be transmitted too far.

There is also the possibility that several explosions might be set off with slight delays, and the effect of one could mask another confusing the interpreter of the grams.

LYNCH. I would need more time to formulate an answer.

MURPHY. The blast should be carried out in seismic land areas and if possible during earthquake swarms. There should be no blowouts and no possible source for detecting radioactivity in the air or in ocean currents

NUTTLI. See answer to question 17.

OLIVER. To hide an explosion some or all of the following measures might be taken:

1. Use a relatively small explosion.
2. Fire it in a highly seismic area.
3. Arrange it to go off more or less simultaneously with a local earthquake.
4. Arrange it to go off simultaneously with the arrival of compressional waves from a distant earthquake.
5. Fire it beneath a region where surface evidence of tunneling, etc., would be easy to conceal. Stress this concealment.
6. Fire near a coast so that seismograph stations are limited to roughly 180° of azimuth from the shot point.
7. Use the depth of the source and possibly topography in the vicinity of the source to distort the radiation pattern.
8. Conduct research on this problem. Since virtually nothing has been done on this subject, research is almost certain to produce new methods and techniques that might be used.

POULTER. Since an underground shot can be completely contained, it is only the surface operations and such minor surface disturbances as

are caused by the blast that would in any way identify the area as a nuclear test site.

It would only be necessary to have a logical explanation for those two factors.

It would therefore seem that, if a nuclear shot were fired in conjunction with a rather large mining or quarrying operation, it might well be possible to conceal it from even the major portion of the personnel working at the mine or quarry.

The necessary underground tunneling could be conducted on the excuse of exploring the extent of the deposit. The security could be disguised in many ways, such as a safety measure to personnel, etc. Subsequent mining operations could proceed within less than 100 feet of an actual shot location without detecting radioactivity.

PRESS. I would prefer not to answer this question, but I have considered this problem in determining the 5 percent probability figure quoted above.

RAITT. There is no way to carry out an underground nuclear explosion without high risk of detection by the system unless it is less than 1 kiloton, for by definition the system asked for in questions 15 to 17 is to be adequate to detect tests greater than 1 kiloton. The difficulty lies in deciding how many stations are necessary. If the station spacing is large so that the detection of a Rainier-type test is marginal, then it may be possible to surround the bomb with absorbing material to decrease the seismic waves. However I believe the Rainier test itself was made in material likely to have a strong absorbing effect. If I had this problem, I would attempt to find localities or site treatments that would reduce the intensity of the seismic waves at the source,

RICHTER, I would (1) select an area in which natural earthquakes are frequent, (2) set up a seismograph and try to fire just after a large earthquake, (3) choose a season of heavy storms, (4) make the explosion as small as possible. A further possibility would be to fire a large and announced nonnuclear explosion within 50 miles and about 2 seconds earlier, I would consider flying personnel and equipment to some remote part of the world.

ROMNEY. Several possibilities are suggested. I am not able to evaluate their respective merits in detail.

(*a*) Fire in a well drilled deep under the bottom of a shallow sea.

Even if the event was suspected from seismic evidence to be an explosion, it seems exceedingly unlikely that nuclear proof could be produced by inspection teams.

(*b*) Fire in thick ice in Antarctica. Since ice is a very poor transmitter of seismic energy, it is doubtful that a blast as large as 10 kilotons would even be noticed. The net effect would probably be to melt 120,000 cubic meters of ice (a 50-meter cube).

SLICHTER. No answer.

TOCHER. No answer.

TUVE. No answer.

WALTER. (*a*) Limit the test size.

(*b*) Conduct test at deepest possible depth. Depth could have a considerable effect on small-size testing.

(*c*) If possible, bury the explosive device beneath a thick geologic sill type intrusion so that all effects would be held beneath this cover.

WILSON. Without having proposed a specific system in question 15,

it is a little difficult for me to answer this question. I might point out that the Rainier blast might have passed almost unnoticed seismically in the United States had it been fired in, say, western Nebraska, northern North Dakota, or a number of other such places. This is despite the fact that the United States has quite a large number of seismograph stations. It would undoubtedly have been recorded but would have probably entered the historical file as a minor earthquake in an odd location.

WORZEL. See answer to question 15.

19. What methods might be used to hide a test in the absence of such an inspection system? In the absence of seismic stations in the U. S. S. R. and China, do you believe that a deep underground nuclear test could be conducted in such a manner as to prevent our obtaining positive proof that a nuclear explosion had occurred if the yield were as large as 10 kilotons? As large as 50 kilotons? As large as 100 kilotons? As large as 1,000 kilotons? If your answer is negative, explain the nature of the data which you would consider adequate to prove the fact of a nuclear explosion.

BAILEY. In the absence of such an inspection system, the above method would also apply. A deep underground nuclear test of 1,000 kilotons could be effectively hidden by a nearby earthquake of magnitude 7 or greater.

BEERS. It is my opinion that a detection system can be designed to detect 10 kilotons under Rainier conditions or larger without requiring installations in U. S. S. R. or China. The exception stated in No. 11 should be noted.

BENIOFF. The Pamirs region of Turkestan is subject to rather frequent earthquakes and it is rather a remote possibility that in a test site situated there, explosions could be arranged to be triggered by an earthquake and thus be rendered less detectable.

CARDER. (*a*) A similar arrangement as in 18 or conducting tests in thick strata of shale or tuff and keeping yields in the 2-kiloton range or lower and choosing seismic areas in which to conduct the test should prove effective in keeping a nuclear test secret. (*b*) If seismic areas are chosen, a 10 kiloton underground explosion may remain undetected about half of the time but if several tests are conducted, at least 1 or 2 may be positively identified provided monitoring stations are located in the quiet areas of India and elsewhere along the periphery of U. S. S. R. and China. If tests are conducted in a nonseismic area, nearly all in 10-kiloton range (if underground) or over may be positively identified. Fifty kilotons to one hundred kilotons, if underground may be identified by existing stations about half of the time. One thousand-kiloton shots if underground may be positively identified all of the time, unless it occurs during a strong earthquake of magnitude 7 or higher.

DONN. No answer.

EVERNDEN. No answer.

EWING. See the reply of Dr. Jack Oliver.

GUTENBERG. I do not quite understand the meaning of the second sentence, "In the absence of seismic stations in the U. S. S. R. and China," There are almost 100 stations there—many of them first class, and their cooperation certainly would be required. If they would not cooperate, or would not furnish their records, or if many

would have defective records this would certainly be a reason for suspicion that they would try to conceal something. To my best knowledge, I do not believe that it is possible to prove the fact of a small nuclear explosion beyond reasonable doubt.

HASKELL. If only stations outside U. S. S. R. and Chinese-controlled territory were to be used, it is believed that seismic detection and location of underground explosions down to 100 kilotons could be made almost certain. Shots as small as 10 kilotons would be detected some of the time but probably not under all circumstances. Seismic detection of a large yield explosion would suggest that the shot was nuclear, but actual proof would require onsite detection of high concentrations of radioactive debris.

HEINRICH. I do not have information on limiting distances for various yield nuclear blasts.

HEROY. In the absence of nearby seismic stations, an explosion could be easily concealed by placing it in a highly seismic area such as Hindu Kush, the Himalayan arc, or Kamchatka.

I believe that deep underground nuclear tests of yields in the range of 10 kilotons up to 50 kilotons (assuming they could be contained) could be conducted in such a manner as to prevent our obtaining positive proof of their occurrence, in the absence of seismic inspection system.

It is difficult for me to understand how explosions of yield greater than 50 kilotons could be contained underground. If this were possible, the epicenters would certainly be located seismically. Whether they would produce diagnostic seismograms I do not know, but I think that long-period seismometers might play an important part in determining such cases. However, I have no experience in this respect.

HOWELL. Without an inspection system, underground tests would be very simple to hide. The shaft dug for detonating the test would be no different from other mining operations and the debris of excavation could be easily concealed or camouflaged to look like an ordinary engineering operation. Without seismic stations in the U. S. S. R and China small and moderate sized nuclear explosions would be undetectable I suspect that this is certainly true for 10-kiloton explosions, possibly true for 50- and 100-kiloton explosions, but I think that it might always be possible to detect a 1,000-kiloton detonation.

I know of no foolproof way of monitoring nuclear explosions which would assure with complete confidence that any one nation could keep track of what another nation was doing. It is to be expected that as knowledge of nuclear science increases it will become possible to use nuclear energy in a wide range of explosive and other uses for both peaceful and military applications. The variety of industrial processes involved will be so great that they cannot be efficiently monitored.

KNOPOFF. Shoot deep, with a low yield, and in a seismically active region.

LEET. See No. 15.

LEPP. I believe that, in the case of a large underground explosion (50 kilotons plus), seismic stations located outside the Iron Curtain could identify the shock as an underground explosion. In this case, the nature of the seismogram would identify the shock as an explosion, and the magnitude would point strongly to a nuclear explosion.

LINEHAN. In the absence of seismic detection equipment of sufficient range, I am uncertain what other equipment might be used to detect such an explosion of any size. Perhaps the use of seismoelectric effects might be made, or telluric current changes.

LYNCH. I feel that our present seismic personnel at United States Coast and Geodetic Survey, California Tech, California, Columbia, Weston, St. Louis, etc., could devise a foolproof test to reveal any clandestine violation.

MURPHY. To hide the tests it is best to keep the energy yield low. Underground nuclear explosions of 10 kilotons yield if in nonseismic areas would probably be detected—if in seismic areas stated before it is difficult to distinguish, so some would go undetected. Above 10 kiloton explosions, provided there are a number of them, would be detected if in nonseismic areas. If they occur during earthquake swarms there is very little likelihood for detection.

NUTTLI. Assuming that our H-bomb tests in the Pacific in the years 1954 and 1956 had an equivalent energy yield of 1,000 kilotons (based only on information obtained from newspaper accounts), I believe it would not be possible to conceal an underground explosion of such magnitude. Such an explosion could be identified from the data of the present seismograph stations operating in the "non-Soviet world." I do not possess sufficient information to comment upon the positive identification of explosions in the 10 kilotons to 100 kilotons range.

OLIVER. The methods described in 18 apply equally to this question.

10 kilotons: could be hidden.

50 kilotons: I doubt that 100 percent certainly would be obtained.

100 kilotons: probably could be definitely identified as a nuclear explosion on size.

1,000 kilotons: for all practical purposes this could be identified with 100 percent certainty.

POULTER. From the seismic results obtained on Rainier, it is estimated that nuclear explosions of as much as 170 kilotons can be conducted in the Nevada test site with safety.

I believe, therefore, it is highly probable that even a megaton bomb might be fired underground with a better than even chance that it could never be proven.

PRESS. In the absence of seismic stations in the U. S. S. R. and China, an underground test in the 2- to 10-kiloton class or smaller could be conducted in such a manner as to prevent our obtaining positive proof that a nuclear explosion had occurred. Fifty kiliton tests and larger could not be conducted without probable detection, the probability of detection increasing with the size of the explosion. I think we could detect a good percentage of tests between 10 kilotons and 50 kilotons.

RAITT. I think it impossible to obtain positive proof of a nuclear explosion from distant seismic waves alone. However, there would be a strong inference that it would be nuclear if it were much larger than 4 kilotons, as this is the largest known manmade chemical explosion. Positive proof of the nature of the explosion would require samples at the site. If it is found that the explosion is deeply underground, drilling at the site would be needed for identification, but it is hard for me to imagine anyone loading even as much as 10 kilotons

of chemical explosive into a keep underground site. I know of no reason for doing this.

RICHTER. The methods suggested under 18 would be still more effective in the absence of inspection.

I do not believe an explosion as large as 1,000 kilotons could be concealed deliberately. An explosion at the 10 kiloton level could be concealed by a distant earthquake, or among the aftershocks of a large local earthquake. Concealing explosions of 50 to 100 kilotons would partly depend on luck, and the necessary preparations would probably not be undertaken.

I am not sure whether or not an underground nuclear explosion could be identified as such from the records of distant stations only.

ROMNEY. In the absence of an inspection system, tests could be concealed by firing in any seismic area. To the best of my knowledge, there is no proof of any nuclear explosion except nuclear debris.

SLICHTER. No answer.

TOCHER. No answer.

TUVE. No answer.

WALTER. (*a*) (i) Carry out tests in seismic areas so as to make the interpretation problem as complex as possible.

(ii) Change locations frequently.

(iii) Limit size of test.

(iv) Conduct test at depth.

(*b*) 10 kilotons, possibly; 50 kilotons, not likely; 100 kilotons, not likely, 1,000 kilotons, very unlikely.

WILSON. In the absence of a large number of seismic stations in the U. S. S. R. and China, I feel there is no doubt that a rather large nuclear test could be conducted in such a manner as to prevent our knowing that it had occurred. I think the main problem here is one of confinement. Without being an authority on the subject, I would be rather doubtful as to the practicability of trying to contain any explosion as large as 50 kilotons, and I think it might be economically impractical to contain one as small as 10 kilotons. I think the chances of containing one as large as 1,000 kilotons are rather remote. If the explosion is not contained, I would assume that it would be detected by other means.

WORZEL. In the absence of an inspection system a test might be hidden by:

1. Firing in a highly seismic area;
2. Firing just after a magnitude five or larger earthquake,
3. Firing in thick spongy areas where high absorption could be expected;
4. Firing at such a distance within their national boundaries that a meteor impact could not be denied by outside observers.

I believe 10 kilotons could be hidden, 50 kilotons could be hidden some of the time; 1,000 kilotons could probably not be hidden.

SEISMOGRAPH STATIONS OF THE WORLD

• EACH SOLID CIRCLE REPRESENTS ONE SEISMOGRAPH STATION

UNION OF SOVIET SOCIALIST REPUBLICS
ALASKA (U.S.)
CANADA
ALEUTIAN ISLANDS
KURIL IS. (U.S.S.R.)
MONGOLIAN REPUBLIC
NORTH KOREA
SOUTH KOREA
JAPAN
CHINA
UNITED STATES
MEXICO
FORMOSA
HONG KONG (BR.)
NORTH LAOS
VIET NAM
THAILAND
CAMBODIA
SOUTH VIET NAM
REPUBLIC OF THE PHILIPPINES
HAWAIIAN IS. (U.S.)
GUAM (U.S.)
KOROR (U.S. Trust)
TRUK (U.S. Trust)
SWAN I. (U.S.)
BR. HOND.
HONDURAS
NICARAGUA
GUATEMALA
EL SALVADOR
COSTA RICA
PACIFIC OCEAN
NORTH BORNEO
BRUNEI
SARAWAK
MALAYA
SANGIHE IS.
BORNEO
CELEBES
SUMATRA
JAVA
BANDA
NEW GUINEA (AUSTL.)
NEW BRITAIN (Austl.)
INDONESIA
EQUATOR
W. SAMOA (N.Z. Trust)
FIJI IS. (Br.)
TAHITI (Fr.)
NEW CALEDONIA (Fr.)
AUSTRALIA
RAOUL I. (N.Z.)
NEW ZEALAND
TASMANIA
CHATHAM IS. (N.Z.)
MACQUARIE I. (Austl.)
ANTARCTIC CIRCLE
SOUTH POLE
ANTARCTICA
SOUTH AMERICA
LONGITUDE WEST OF GREENWICH
LONGITUDE EAST OF GREENWICH
LONGITUDE EAST OF GREENWICH
LONGITUDE WEST OF GREENWICH

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IV. APPENDIX

Seismograph Stations of the World

The following is a list of names of all publicly known seismograph stations in the world. It was compiled from records of the Coast and Geodetic Survey of the United States Department of Commerce. It should be pointed out that there is a great deal of difference in the type of seismographs, continuity of operation, and other factors affecting the records obtained at each station.

The list is arranged according to geographical region. Where the precise location is not given for a station, it is not available at the present time.

Station	Location	
	Latitude	Longitude
UNITED STATES, ALASKA, AND HAWAII		
Alabama: Spring Hill	30°41′17.77″ N.	88°08′39.31″ W.
Arizona:		
Boulder Dam	36°00′55.47″ N.	114°44′11.86″ W.
Tucson	32°14.8′ N.	110°50.1′ W.
Arkansas:		
Fayetteville	36°05.46′ N.	94°11.47′ W.
Little Rock	34°47′ N.	92°21′ W.
California:		
Arcata	40°52.6′ N.	124°04.5′ W.
Barrett	32°40.8′ N.	116°40.3′ W.
Berkeley	37°52.3′ N.	122°15.6′ W.
Big Bear	34°14.3′ N.	116°54.8′ W.
China Lake	35°49.0′ N.	117°35.8′ W.
Dalton	34°10.2′ N.	117°48.6′ W.
El Centro	32°47.8′ N.	115°32.9′ W.
Ferndale	40°34′ N.	124°16′ W.
Fort Tejon	34°52.4′ N.	118°53.6′ W.
Fresno	36°46.1′ N.	119°47.8′ W.
Haiwee	36°08.2′ N.	117°56.8′ W.
Hayfield	33°42.4′ N.	115°38.2′ W.
Isabella	35°38.6′ N.	118°28.6′ W.
King Ranch	35°19.6′ N.	119°44.7′ W.
Mineral	40°21′ N.	121°35′ W.
Mount Hamilton	37°20.4′ N.	121°38.6′ W.
Mount Wilson	34°13.4′ N.	118°03.5′ W.
Palo Alto	37°25.1′ N.	122°10.8′ W.
Palomar	33°21.2′ N.	116°51.7′ W.
Palos Verdes	33°45.5′ N.	118°21.4′ W.
Pasadena	34°08.9′ N.	118°10.3 W.
Pomona		
Riverside	33°59.6′ N.	117°22.5′ W.
San Diego	32°41′ N.	117°14.5′ W.
San Francisco	37°46.4′ N.	122°27.2′ W.
Santa Barbara	34°26.5′ N.	119°42.8′ W.
Santa Clara	37°21′ N.	121°58′ W.
Shasta	40°41′44″ N.	122°23′19″ W.
Tinemaha	37°03.3′ N.	118°13.7′ W.
Ukiah	39°08′14″ N.	123°12′38″ W.
Woody	35°42.0′ N.	118°50.8′ W.
Colorado:		
Boulder	40°00′30″ N.	105°16′15″ W.
Denver	39°47.5′ N.	105°02′ W.
District of Columbia:		
Washington, D. C.	38°53′33″ N.	77°01′59″ W.
Washington, D. C. (NRL)	38°50′ N.	77°05′ W.
Georgetown University	38°54′ N.	77°04′ W.
Illinois:		
Chicago	41°54′ N.	87°38′ W.
Do	41°47′20″ N.	87°35′57″ W.

Station	Location	
	Latitude	Longitude
UNITED STATES, ALASKA, AND HAWAII—continued		
Indiana:		
Bloomington		
Terre Haute	39°28′ N	87°25′ W.
Iowa: Des Moines		
Louisiana: New Orleans	20°56′54″ N	90°07′12″ W.
Maryland: Woodstock	39°20′ N	76°52.5′ W.
Massachusetts:		
Harvard Seismograph Station	42°30′26″ N	71°33′45″ W.
Weston	42°23′04.88″ N	71°19′19.46″ W.
Williamstown	42°42′51″ N	73°12′40″ W.
Michigan: Ann Arbor	42°17′ N	83°44′ W.
Minnesota: Duluth	46°49.2′ N	92°05.0′ W.
Missouri:		
Cape Girardeau	37°19′ N	89°32′ W.
Florissant	38°48′06″ N	90°22′12″ W.
St. Louis (No. 1)	38°38′11″ N	90°14′00″ W.
St. Louis (No. 2)	38°38′10″ N	90°14′10″ W.
Montana:		
Bozeman	45°40′01″ N	111°02′43″ W.
Butte	46°00.8′ N	112°33.8′ W.
Hungry Horse	48°20′58″ N	114°01′39″ W.
Nebraska: Lincoln	40°50.3′ N	90°39.2′ W.
Nevada:		
Boulder City	35°58′51″ N	114°50′02″ W.
Eureka	39°30′08.339″ N	115°59′21.906″
Reno	39°32′19″ N	110°48′45″ W.
New York:		
New York	40°49.3′ N	73°57.2′ W.
Buffalo	42°56′ N	78°51′ W.
Buffalo-L, Elma	42°50′51″ N	78°31′39″ W.
Fordham University	40°51′47″ N	73°53′8″ W.
Palisades	41°00′25″ N	73°54′31″ W.
North Carolina: Chapel Hill	35°55′ N	79°03′ W.
Ohio:		
Cincinnati	39°08.7′ N	84°29.8′ W.
Cleveland	41°29′27.90″ N	81°31′52.22″ W.
Oregon:		
Corvallis	44°35′ N	123°18′ W.
Portland		
Pennsylvania:		
Philadelphia	39°57′32″ N	75°10′30″ W.
Pittsburgh	40°26.7′ N	79°57.2′ W.
Waynesburg	39°54′ N	80°11′ W.
South Carolina: Columbia	34°00′ N	81°02′ W.
South Dakota: Rapid City	44°04.6′ N	103°12.0′ W.
Texas:		
Austin	30°17′ N	97°47′ W.
Dallas	32°50′46.8″ N	96°47′01.6″ W.
Lubbock	33°35′ N	101°52′ W.
Utah:		
Logan	41°44.5′ N	111°48.8′ W.
Salt Lake City	40°45′55″ N	111°50′54″ W.
West Virginia: Morgantown	39°37′59″ N	79°57′17″ W.
Washington:		
Seattle	47°39′ N	122°18.5′ W.
Mayfield	46°5′ N	122.5° W.
Mount St. Michael, Spokane	47°43′48″ N	117°20′32″ W.
Wisconsin: Milwaukee		
Wyoming: Laramie	41°18′52″ N	105°34′59″ W.
Alaska:		
College	64°51.8′ N	147°49.1′ W.
College (outpost)	64°53′07.8″ N	147°48′04.3″ W.
Sitka	57°03′25″ N	135°19′28″ W.
Aleutian Islands	53°52.4′ N	166°32.0′ W.
Territory of Hawaii:		
Hawaiian Volcano Observatory	19°26′ N	155°16′ W.
Honolulu	21°18′13″ N	158°05′44″ W.
Kipapa, Honolulu	21°25.3′ N	158°00.9′ W.
CANADA, ICELAND, AND GREENLAND		
Canada:		
Alberni	49°16′14″ N	124°49′18″ W.
Banff	51°10.3′ N	115°33.5′ W.
Coleman	49°38.1′ N	114°31.2′ W.
Fernie	49°29.0′ N	114°58.6′ W.
Halifax	44°38′ N	63°36′ W.
Horseshoe Bay	49°22′39″ N	123°16′33″ W
Kirkland Lake	48°08′41″ N	80°01′45″ W.
Ottawa	45°23′38″ N	75°42′57″ W.

Station	Location	
	Latitude	Longitude
CANADA, ICELAND, AND GREENLAND—continued		
Canada—Continued		
Resolute, Cornwallis Island	74°41′ N.	94°54′ W.
Saskatoon	52°08′ N.	106°38′ W.
Schefferville	54°49′ N.	66° 41′ W.
Seven Falls	47°07.4′ N.	70°49.6′ W.
Shawinigan Falls	46°33.1′ N.	72°45.8′ W.
Victoria	48°31′14″ N.	123°24′56″ W.
Iceland:		
Vik, Reykjavik	63°25.3′ N.	18°06.0′ W.
Revkjavik	64°08′20″ N.	21°54′22″ W.
Greenland:		
Ivigtut	61°12′ N.	48°11′ W.
Nord	81°26′09″ N.	16°40′12″ W.
Scoresby-Sund	70°29′ N.	21°′57′ W.
MEXICO, CENTRAL AMERICA, AND CARIBBEAN AREA		
Mexico:		
Chihuahua	28°38′12″ N.	106°04′42″ W.
Comitan	16.3 N.	92.0 W.
Guadalajara	20°40′46″ N.	103°20′27″ W.
Manzanillo	19°03′15″ N.	104°19′50″ W.
Mazatlán	23°11′17″ N.	106°24′22″ W.
Mérida	20°56′51″ N.	89°36′59″ W.
Oaxaca	17°01′13.50″ N.	96°45′46″ W.
Puebla	19°02′30″ N.	98°11′48″ W.
Tacubaya	19°24′18″ N.	99°11′37″ W.
Veracruz	19°12′02″ N.	96°08′16″ W.
Central America:		
Balboa Heights, C. Z.	8°57′39″ N.	79°33′29″ W.
San Jose, Costa Rica	09°56′01″ N.	84°04′40″ W.
Ayagualo, El Salvador	13°38′46″ N.	89°17′22″ W.
San Salvador, El Salvador	13°40′52″ N.	89°11′53″ W.
Santiago De Maria, El Salvador	13°29′10″ N.	88°28′14″ W.
Guatemala City, Guatemala	14°39′10″ N.	90°32′01″ W.
Caribbean area:		
Antigua, British West Indies	17°08.6′ N.	61°50.1′ W.
Barbados, British West Indies	13°07.4′ N.	59°35.6′ W.
Bermuda-C, St. George's, Bermuda	32°22′46″ N.	64°40′52″ W.
Dominica, British West Indies	15°17.7′ N.	61°23.5′ W.
Grenada, British West Indies	12°02.7′ N.	61°44.1′ W.
Kingston, Jamaica, British West Indies	17°58′25.4″ N.	76°47′06.2″ W.
St. Vincent, British West Indies	13°10.2′ N.	61°15.5′ W.
St. Lucia, British West Indies	14°01.7′ N.	61°00.5′ W.
Trinidad, British West Indies	10°44.7′ N.	61°33.8′ W.
Ciudad Trujillo, Dominican Republic	18°27′28″ N.	69°54′45″ W.
Fort de France, Martinique, French West Indies	14°44′ N.	61°09′ W.
St. Claude, Guadeloupe, French West Indies	16°02′ N.	61°41′ W.
Port au Prince, Haiti	18°33′20″ N.	72°20′15″ W.
San Juan, P. R.	18°22.9′ N.	66°07.1′ W.
SOUTH AMERICA		
Argentina:		
Buenos Aires	35°35′30″ S.	58°29′00″ W.
Bosque Alegre	31°34′54″ S.	64°32′45″ W.
Chilecito	29°10′ S.	67°30′ W.
La Plata	34°54′32″ S.	57°55′56″ W.
Mendoza	32°45′18″ S.	68°51′51″ W.
Pilar (Cordoba)	31°40′ S.	63°53′ W.
Salta	24°47′ S.	65°25′ W.
Tucamian	26°48′ S.	65°12′ W.
Bolivia:		
La Paz	16°29′43″ S.	68°07′57.7″ W.
Sucre	19°02′48″ S.	65°15′52″ W.
Brazil: Rio de Janeiro	22°53′42″ S.	43°13′24″ W.
Chile:		
Antofagasta	23°39′02″ S.	70°24′42″ W.
Concepción	36°49′41″ S.	73°02′42″ W.
Escuela de Ingenieria	33°27′33″ S.	70°40′04″ W.
Panimavida	36°49′41″ S.	73°02′42″ W.
Punta Arenas	53°09′19″ S.	70°54′02″ W.
San Cristobal	33½° S.	71° W.
San Javier	35°38′30″ S.	71°43′30″ W.
Santa Lucia	33°26′23″ S.	70°38′33″ W.
Santiago	33°26′40″ S.	70°38′54″ W.
Valparaiso		

Station	Location	
	Latitude	Longitude
SOUTH AMERICA—continued		
Colombia:		
Bogotá	4°37′23″ N	74°03′54″ W.
Chinchina	4°58′ N	75°37′ W.
Fuquene	5°28′12″ N	73°44′14″ W.
Galerazamba	10°47′08″ N	75°15′44″ W.
Ecuador: Quito	00°13′ S	78°30′ W.
Peru:		
Lima	11°48′44.3″ S	77°09′32.8″ W.
Lima	12°03′ S	77°01′ W.
Huancayo	12°02′7″ S	75°20′2″ W.
Venezuela: Caracas	10°30′24.4″ N	66°55′49.5″ W.
EUROPE, UNITED KINGDOM, AND SCANDINAVIAN COUNTRIES		
Austria:		
Graz (Steiermark)	47°04.6′ N	15°26.9′ E.
Vienna	48°14.9′ N	16°21.7′ E.
Belgium: Uccle	50°47′54″ N	4°21′34″ E.
Bulgaria: Sofia	42°41′07″ N	23°20′03″ E.
Czechoslavakia:		
Bratislava	48°10′06″ N	17°06′18″ E.
Cheb	50°04′46″ N	12°22′34″ E.
Hurbanovo	47°52′25″ N	18°11′34″ E.
Prague	50°04′13″ N	14°25′59″ E.
Pruhonice	49°59′ N	14°33′ E.
Skalnate Pleso	49°11′20″ N	20°14′42″ E.
Denmark: Copenhagen	55°41′ N	12°27′ E.
Finland:		
Helsinki	60°10′ N	24°58′ E.
Sodankyla	67°22′ N	26°39′ E.
France:		
Bagneres-de-Bigorra	43°04′ N	0°09′ E.
Besancon	47°15′ N	5°59′ E.
Clermont-Ferrand	45°45′46″ N	03°06′09″ E.
Lille	50°36′57″ N	3°04′15″ E.
Marseille	43°18′19″ N	5°23′38″ E.
Paris	48°48′34″ N	2°29′37″ E.
Strasbourg	48°35′05″ N	7°45′57″ E.
Germany, Eastern Zone:		
Jena	50°56′07″ N	11°35′00″ E.
Collmberg (Leipzig)	51°18.6′ N	13°00′ E.
Potsdam		
Ravensburg	47°47′00″ N	9°36′56″ E.
Germany, Federal Republic:		
Ebingen	48°10′54″ N	8°57′45″ E.
Hamburg	53°27′54″ N	9°55′29.2″ E.
Hof	50°18′49″ N	11°52′39″ E.
Karlsruhe	49°00′39″ N	8°24′44″ E.
Stuttgart	48°46′15″ N	9°11′36″ E.
Tubingen	48°31′37″ N	9°03′40″ E.
Greece:		
Athens	37°58′20″ N	23°43.0′ E.
Athens		
Samos	37.8° N	26.7° E.
Hungary:		
Budapest	47°29′29″ N	19°03′53″ E.
Kalocsa	46°31′43″ N	18°58′35″ E.
Kecskemet	46°54′44″ N	19°41′54″ E.
Szeged	46°14′54″ N	20°08′29″ E.
Ireland: Rathfarnham, Dublin	53°17′55″ N	6°16′57″ W.
Italy:		
Bologna	44°29.3′ N	11°19′42″ E.
Catania	37°30.0′ N	15°05.9′ E.
Cuglieri	40°11′16″ N	8°33′58″ E.
Firenze	43°46′40″ N	11°15′24″ E.
Messina	38°11.8′ N	15°33.3′ E.
Milan	45°44′4″ N	3°32′41″ W.
Oropa	45°37′ N	7°58′ E.
Padova	45°24′ N	11°52′ E.
Pavia	45°11′ N	9°10′25″ E.
Pieve di Cadore	46°24.6′ N	12°22.2′ E.
Prato	43°53′ N	11°05.5′ E.
Reggio Calabria	38°06′20″ N	15°38′36″ E.
Rocca di Papa	41°45.5′ N	12°43′ E.
Rome	41°54.2′ N	12°30.8′ E.
Salo	45°36′27″ N	10°31′20″ E.
Siena	43°19′12″ N	11°18′44″ E.
Taranto	40°28.5′ N	17°15.3′ E.
Tolmezzo	46°24′25″ N	13°00′52″ E.
Trieste	45°38′36″ N	130°45′08″ E.

Station	Location	
	Latitude	Longitude
EUROPE, UNITED KINGDOM, AND SCANDINAVIAN COUNTRIES—continued		
Monaco: (Institute Oceanographique)		
Netherlands:		
De B lt	52°06.1′ N.	5°10.6′ E.
Heerlen	50°53.0′ N.	5°59.08′ E.
Witteveen	52°48′8″ N.	6°41′1″ E.
Norway: Bergen	60°23′18″ N.	5°18′18″ E.
Poland:		
Bytom	50°21′ N.	18°54.9′ E.
Dabrowa Gornicza	50°20′ N.	19° 13.4′ E.
Krakow	50°03.1′ N.	19°56.2′ E.
Raciborz	50°05′ N.	18°11.6′ E.
Warsaw	52°14′ N.	21°02′ E.
Zabrze	50°18.1′ N.	18°47.7′ E.
Portugal:		
Angra do Herosima, Azores	38°39.3″ N.	27°14.1′ W.
Coimbra	48°12′25″ N.	08°25′30″ W.
Lisbon	38°42′59.4″ N.	9°08′56.7″ W.
Porto (Serra do Pilar)	41°08.2′ N.	8°36.1′ W.
Ponto Delgada, Azores	37°44.6′ N.	25°39.7′ W.
Rumania:		
Bacau	46°34′ N.	26°54′ E.
Bucharest	44°24′49″ N.	26°05′48″ E.
Campulung	45°16.1′ N.	25°02.3′ E.
Focasani	45°42′ N.	27°12′ E.
Iassy	47°11′6″ N.	27°33′7″ E.
Timisoara	45°45′ N.	21°13.5′ E.
Spain:		
Alicante	38°21′19.22″ N.	0°29′14.06″ W.
Almeria	36°51′09.07″ N.	2°27′35.18″ W.
Barcelona	41°25′ N.	2°°8′ E.
Ebro	40°49′ N.	0°30′ E.
Granada	37°11′24″ N.	3°35′52″ W.
Logrono	42°28′28″ N.	00°56′18″ E.
Malaga	36°43′39″ N.	4°24′4″ W.
San Fernando (Cadiz)	36°28′4.0″ N.	6°12′19.5″ W.
Toledo	39°52′53″ N.	4°02′55″ W.
Sweden:		
Akureyri	65°40.3′ N.	18°06.0′ W.
Kiruna	67°50.4′ N.	20°25.0′ E.
Lund		
Skalstugan	63°34.8′ N.	12°16.8′ E.
Uppsala	59°51′29″ N.	17°37′37″ E.
Switzerland:		
Basel	47°32′24″ N.	7°34′58.5″ E.
Brig	46°18′55″ N.	7°59′44″ E.
Chur (Coire)	46°50′59.5″ N.	9°32′12.1″ E.
Neuchatel	46°59′50.6″ N.	6°58′26.2″ E.
Zurich	47°22′7.2″ N.	8°34′49.5″ E.
United Kingdom:		
Aberdeen	57°10′ N.	2°06′ W.
Birkenhead		
Cambridge		
Downe	51.3° N.	0.0.
Durham	54°47′ N.	01°34′ W.
Edinburgh	55°55.5′ N.	0°12′44.1″ W.
Jersey (Channel Island)	49°11′32″ N.	2°05′55″ W.
Kew	51°28′6″ N.	0°18′4,″ W.
South Kensington		
Stronghurst	27°21′55″ N.	70°38′33″ W.
Yugoslavia:		
Belgrade	44°49′17.2″ N.	20°27′19.2″ E.
Sarajevo	43°52′40″ N.	18°25′52″ E.
Skopje	41°59′ N.	21°24′ E.
Titograd	42°25′47″ N.	19°15′36″ E.
Zagreb	45°49′ N.	15°59′ E.
U. S. S. R.:		
Abastumani	41°45′ N.	42°50′ E.
Akhalkalaki	41°24′ N.	43°29′ E.
Alma-Ata	43°16′ N.	76°57′ E.
Alma-Ata 2	43°16′ N.	77°23′ E.
Andizhan	40°45′ N.	72°22′ E.
Ashkhabad	37°57′ N.	58°21′ E.
Baku	40°23′ N.	49°54′ E.
Bayram-Ali	37°36′ N.	62°07′ E.
Borzhomi	41°50′ N.	43°23′ E.
Chernovtsy	48°17′ N.	25°56′ E.
Chilik	43°34′ N.	78°25′ E.
Chimkent	42°19′ N.	69°36′ E.
Dushetl	42°05′ N.	44°42′ E.

Station	Location	
	Latitude	Longitude
EUROPE, UNITED KINGDOM, SCANDINAVIAN COUNTRIES—continued		
U. S. S. R—Continued		
Dzhergetal	39°13′ N	71°13′ E.
Fabrichnaya	43°11′ N	76°24′ E.
Feodosiya	45°01′ N	35°23′ E.
Fergana	40°23′ N	71°47′ E.
Frunze	42°53′ N	74°36′ E.
Garm	39°00′ N	70°18′ E.
Gori	41°59′ N	44°07′ E.
Goris	39°30′ N	46°20′ E.
Groznyy	43°19′ N	45°45′ E.
Ili	43°57′ N	77°05′ E.
Irkutsk	52°16′ N	104°19′ E.
Kabansk	52°03′ N	106°39′ E.
Khorog	37°30′ N	71°34′ E.
Kirovabad	40°44′ N	46°22′ E.
Kishinev	47°01′ N	28°50′ E.
Kizyl-Arvat	39°12′ N	56°16′ E.
Klyuchi	56°19′ N	160°52′ E.
Kulyab	37°54′ N	69°45′ E.
Kuril'sk	45°14′ N	147°52′ E.
Kurmenty	43°03′ N	78°17′ E.
Kyakhta	50°22′ N	106°27′ E.
Leninakan	40°46′ N	43°51′ E.
Lenkoran	38°46′ N	48°50′ E.
Lunacharskoy	41°20′ N	69°21′ E.
L'vov	49°49′ N	24°02′ E.
Magadan	59°33′ N	150°48′ E.
Makhachkala	42°58′ N	47°30′ E.
Moscow	55°44′ N	37°38′ E.
Murgab	38°22′ N	73°56′ E.
Nakhichevan	39°12′ N	45°24′ E.
Namangan	40°59′ N	71°40′ E.
Naryn	41°26′ N	75°59′ E.
Obi-Garm	38°43′ N	69°43′ E.
Petropavlosk	53°01′ N	158°39′ E.
Przheval'sk	42°29′ N	78°24′ E.
Pulkovo	59°46′ N	30°19′ E.
Pyatigorsk	44°02′ N	43°04′ E.
Rybachye	42°28′ N	76°11′ E.
Samarkand	39°40′ N	66°59′ E.
Semipalatinsk	50°24′ N	80°15′ E.
Shemakha	40°38′ N	48°38′ E.
Simferopol	44°57′ N	34°07′ E.
Sochi	43°35′ N	39°43′ E.
Stalinabad	38°34′ N	68°46′ E.
Stepanavan	41°00′ N	44°23′ E.
Sverdlovsk	56°50′ N	60°38′ E.
Tashkent	41°20′ N	69°18′ E.
Tbilisi (Tiflis)	41°43′ N	44°48′ E.
Tsikhis-Dzhvari	41°43′ N	43°26′ E.
Uglegorsk	49°05′ N	142°04′ E.
Uzhgorod	48°38′ N	22°18′ E.
Vannorskaya	37°57′ N	58°06′ E.
Vladivostok	43°07′ N	131°54′ E.
Yerevan	40°11′ N	44°30′ E.
Yalta	44°30′ N	34°10′ E.
Yuzhno-Sakhalinsk	47°01′ N	142°43′ E.
Zugdidi	42°31′ N	41°53′ E.
AFRICA		
Algeria:		
Alger University	36°46′ N	3°03′ E.
Algiers	36°48′04″ N	3°02′06″ E
Relizane	35°45′ N	00°33′ E.
Tamanrasset	22°47.5′ N	5°31.4′ E.
Angola: Luanda		
Belgian Congo:		
Astrida	2°36′ S	29°44′ E.
Elizabethville	11°39′ S	27°28′ E.
Le Marinel	10°18′ S	25°24′ E.
Lwiro	2°15′ S	28°48′ E.
Rumangabo	1°20′ S	29°21′ E.
Uvira	3°24½′ S	29°08′ E.
Canary Island: Tenerife	28°27′14″ N	112°33′06″ W.
Egypt: Helwan	29°51′ N	31°20′ E.
Morocco: Averroes	33°18′ N	7°25′ W.
Mozambique: Lourenco Marques	25°58′05″ S	32°35′39″ E.

Station	Location	
	Latitude	Longitude
AFRICA—continued		
Senegal: M'Bour	14°23′ N	16°57′ W.
Togoland: Lome	6°07.3′ N	1°12.8′ E.
Tunisia: Tunis		
South Africa:		
Cape Good Hope	36°56′ S	18°29′ E.
Grahamstown	33°18.6′ S	26°34.5′ E.
Hermanus	34°25.5′ S	19°13.5′ E.
Johannesburg	26°10.9′ S	28°04.5′ E.
Kimberly	28°45.1′ S	24°46.8′ E.
Pietermaritzburg	29°37.2′ S	30°23.8′ E.
Pretoria	25°45.2′ S	28°11.4′ E.
ASIA		
Ceylon: Colombo	6°54′ N	79°52′ E.
China-Formosa:		
Alishan	23°31′ N	120°48′ E.
Hengchun	22°00′ N	120°45′ E.
Hsinchu	24°48′ N	120°58′ E.
Hsinkong	23°06′ N	121°22′ E.
Hwalien	23°58′ N	121°37′ E.
Ilan	24°46′ N	121°45′ E.
Kauhsiung	22°37′ N	120°16′ E.
Penghu	23°32′ N	119°33′ E.
Taichung	24°09′ N	120°41′ E.
Tainan	23°00′ N	12°13′ E.
Taipei	25°02′ N	121°31′ E.
Taitung	22°45′ N	121°09′ E.
Tawu	22°21′ N	120°54′ E.
Yushan	23°29′ N	120°57′ E.
Whalien	23°58′ N	121°37′ E.
China, mainland:		
Canton	23°05′ N	113°17′ E.
Kunming	25°03′ N	102°41′ E.
Lhasa, Tibet	29°42′ N	91°09′ E.
Lanchow	36°05′ N	103°49′ E.
Nanking	32°02.8′ N	118°47.9′ E.
Peking	40°02′ N	106°10′ E.
Tung Yuen Feng	34°30′ N	109° 04′ E.
Zo-Se (Shanghai) China	31°06′ N	121°11′ E.
Hong Kong: Hong Kong	22°18′13.2″ N	114°10′18.7″ E.
India:		
Andhra, Waltair	17.8° N	83.5° E.
Bombay	18°54′ N	72°49′ E.
Calcutta	22°32′ N	88°22′ E.
Chatra	26°50′ N	87°10′ E.
Dehra Dun	30°19′ N	78°03′ E.
Howrah	22°33′15.5″ N	88°18′35.5″ E.
Hyderabad	17°26′ N	78°57′ E.
Kodiakanal	10°14′ N	77°28′ E.
Madras	13°0′ N	80°11′ E.
New Delhi	28°35′ N	77°12′ E.
Poona	18°32′ N	73°51′ E.
Shillong	25°34′ N	91°52′ E.
Tocklai	26°45′ N	94°46′ E.
Indonesia:		
Banda: Banda-Neira		
Flores: Nuabosi		
Java:		
Bandung	6°54′ S	107°39′ E.
Dieng		
Djakarta	6°11′ S	106°51′ W.
Gedeh	7°50′ S	113°50′ E.
Kawah Idjen	8°04′ S	114°14′ E.
Kelud	8°06′ S	112°54′ E.
Lamongan		
Lembang	6°50′ S	107°38′ E.
Merapi	7°24′ S	110°16′ E.
Papandajan		
Semeru	8°06′ S	112°54′ E.
Tangkuban Prahu	7°6′ S	114°02′ E.
Lomblen: Hadakewa		
Sangihe Islands: Awu (Sangihe)		
Sumatra:		
Korintji-Kaba-Dempo	3°42′ S	102°56′ E.
Lake Toba		
Marapi		
Medan	3°33′ N	98°41′ E.
Pulau Weh	5°50′ N	95°18′ E.
Talang	1° S	100.5° E.[1]

[1] Approximately.

Station	Location	
	Latitude	Longitude
ASIA—continued		
Iran: Teheran		
Israel:		
Jerusalem	31°46.9′ N.	35°13.2′ E.
Safed	32°57.6′ N.	35°29.7′ E.
Japan:		
Abashiri	44°01′ N.	144°17′ E.
Aikawa	38°01′ N.	138°15′ E.
Ajiro	35°03′ N.	139°06′ E.
Akita	39°43′ N.	140°06′ E.
Aomori	40°49′ N.	140°47′ E.
Asahikawa	43°46′ N.	142°22′ E.
Aso-san	32°53′ N.	131°05′ E.
Chichibu	35°59′ N.	139°05′ E.
Choshi	35°43′ N.	140°51′ E.
Fukui	36°03′ N.	136°14′ E.
Fukuoka	33°35′ N.	130°23′ E.
Fukushima	37°45′ N.	140°28′ E.
Funatsu	35°30′ N.	138°46′ E.
Gifu	35°24′ N.	136°46′ E.
Hachijo-jima	33°06′ N.	139°47′ E.
Hachinohe	40°32′ N.	141°32′ E.
Hakodate	41°49′ N.	140°45′ E.
Hamada	34°54′ N.	132°04′ E.
Hamamatsu	34°42′ N.	137°43′ E.
Hikone	35°16′ N.	136°15′ E.
Himeji	34°50′ N.	134°42′ E.
Hiroshima	34°22′ N.	132°26′ E.
Ibukiyama	35°23′ N.	136°23′ E.
Iida	35°31′ N.	137°50′ E.
Ishinomaki	38°26′ N.	141°18′ E.
Izuhara	34°12′ N.	129°18′ E.
Kagoshima	31°34′ N.	130°33′ E.
Kakioka	36°14′ N.	140°12′ E.
Kameyama	34°51′ N.	136°28′ E.
Kanazawa	36°33′ N.	136°39′ E.
Kashiwa	35°51′ N.	139°58′ E.
Kobe	34°41′ N.	135°11′ E.
Kochi	33°33′ N.	133°32′ E.
Kofu	35°40′ N.	138°34′ E.
Kumagaya	36°09′ N.	139°23′ E.
Kumamoto	32°49′ N.	130°43′ E.
Kushiro	42°59′ N.	144°24′ E.
Kyoto	35°01′ N.	135°44′ E.
Maebashi	36°24′ N.	139°04′ E.
Maizuru	35°28′ N.	135°23′ E.
Matsue	35°27′ N.	133°04′ E.
Matsumoto	36°15′ N.	137°58′ E.
Matsushiro	36°33′ N.	138°13′ E.
Matsuyama	33°50′ N.	132°47′ E.
Mishima	35°07′ N.	138°56′ E.
Mito	36°23′ N.	140°28′ E.
Miyako	39°39′ N.	141°58′ E.
Miyazaki	31°55′ N.	131°25′ E.
Mizusawa	39°08′ N.	141°08′ E.
Mori	42°06′ N.	140°34′ E.
Morioka	39°42′ N.	141°10′ E.
Muroran	42°20′ N.	140°58′ E.
Murotomisaki	33°15′ N.	134°11′ E.
Nagano	36°40′ N.	138°12′ E.
Nagasaki	32°44′ N.	129°53′ E.
Nagatsuro	34°36′ N.	138°51′ E.
Nagoya	35°10′ N.	136°58′ E.
Nara	34°41′ N.	135°50′ E.
Nemuro	43°20′ N.	145°35′ E.
Niigata	37°55′ N.	139°03′ E.
Obihiro	42°55′ N.	143°13′ E.
Oita	33°14′ N.	131°37′ E.
Oiwake	36°20′ N.	138°33′ E.
Okayama	34°41′ N.	133°55′ E.
Omaezaki	34°36′ N.	138°13′ E.
Onahama	36°57′ N.	140°54′ E.
Osaka	34°39′ N.	135°32′ E.
Oshima	34°46′ N.	139°23′ E.
Owashi	34°04′ N.	136°12′ E.
Sara	33°15′ N.	130°18′ E.
Saigo	36°12′ N.	133°20′ E.
Sakata	38°54′ N.	139°50′ E.
Sapporo	43°03′ N.	141°20′ E.
Sendai	38°16′ N.	140°54′ E.
Shimizu	32°47′ N.	132°58′ E.
Shimonoseki	33°57′ N.	130°56′ E.

Station	Location	
	Latitude	Longitude
ASIA—continued		
Japan—Continued		
Shionomisaki	33°27′ N	135°46′ E.
Shirakawa	37°07′ N	140°13′ E.
Shizuoka	34°58′ N	138°24′ E.
Sumoto	34°20′ N	134°55′ E.
Suttsu	42°47′ N	140°14′ E.
Takada	37°06′ N	138°15′ E.
Takamatsu	34°19′ N	134°03′ E.
Takayama	36°09′ N	137°15′ E.
Tokushima	34°04′ N	134°35′ E.
Tokyo	35°41′ N	139°46′ E.
Tomakomai	42°31′ N	141°35′ E.
Tomie	32°37′ N	128°46′ E.
Tomisaki	34°55′ N	139°50′ E.
Tori-shima	30°29′ N	140°18′ E.
Tottori	35°31′ N	134°11′ E.
Toyama	36°42′ N	137°12′ E.
Toyooka	35°32′ N	134°49′ E.
Tsu	34°42′ N	136°31′ E.
Tsuruga	35°39′ N	136°04′ E.
Tsurugiyama	33°51′ N	134°06′ E.
Unzendake	32°44′ N	130°15′ E.
Urakawa	42°10′ N	142°47′ E.
Utsunomiya	36°33′ N	139°52′ E.
Uwajima	33°14′ N	132°33′ E.
Wajima	37°23′ N	136°54′ E.
Wakayama	34°14′ N	135°10′ E.
Wakkanai	45°25′ N	141°41′ E.
Yaku-shima	30°27′ N	130°30′ E.
Yamagata	38°15′ N	140°21′ E.
Yokohama	35°26′ N	139°39′ E.
Yonago	35°26′ N	133°21′ E.
Korea:		
Keizgo (may not be operating)	37°34′ N	126°58′ E.
Taikyu (Taego) (may not be operating)	35°52′ N	128°36′ E.
Tyosen (Zinsen) (may not be operating)	37°29′ N	126°38′ E.
Lebanon: Ksara	33°49′25.6″ N	35°53′30″ E.
Pakistan:		
Chittagong	22°16′ N	91°49′ E.
Lahore	31°32.6′ N	74°19.7′ E.
Peshawar	34°00.3′ N	71°32.9′ E.
Quetta	30°11.3′ N	66°57.0′ E.
Philippine Islands:		
Ambulong	12°15′ N	121°00′ E.
Butuan	08°56′ N	125°32′ E.
Diliman	14°40′ N	121°05′ E.
Iloilo City	10°42′ N	122°34′ E.
Mambajao	9°15′ N	125°36′ E.
Bagio	16°24′39″ N	120°34′47″ E.
Manila	14°40′ N	121°05′ E.
Turkey:		
Kastamonu	41°22.3″ N	30°46.0″ E.
Istanbul	41°02.6′ N	28°59.1′ E.
Cine, Istanbul	37°36.0′ N	28°05.2′ E.
Istanbul	41°03′56″ N	29°03′33″ E.
Vietnam: Phu Lien	20°48′ N	106°38′ E.
AUSTRALIA, NEW ZEALAND, AND PACIFIC ISLANDS		
Australia:		
Adelaide		
Brisbane	27°30′02″ S	153°00′53″ E.
Charters Towers	20°5.4′ S	146°15.2′ E.
Macquarie Island Station	54°29′55″ S	158°58′22″ E.
Melbourne	37°49′53″ S	144°58′24″ E.
Perth	31°47′ S	115°50′ E.
Riverview	33°49′46″ S	151°09′30″ E.
Sydney	33°52′ S	151°12′ E.
Woody Point	27°15′37″ S	153°15′20.6″ E.
New Zealand:		
Arapuni	38°05′ S	175°39′ E.
Auckland	36°52′ S	174°48′ E.
Bunnythorne	40°17′ S	175°36′ E.
Cebbies Pass	43°41.8′ S	172°38.8′ E.
Christchurch	43°32′ S	172°37′ E.
Cobb	41°05′ S	172°44′ E.
Hastings	39°38′ S	176°53′ E.
Havelock North	39°41′ S	176°53′ E.

Station	Location	
	Latitude	Longitude
AUSTRALIA, NEW ZEALAND, AND PACIFIC ISLANDS—continued		
New Zealand—Continued		
Kaimata	42°31′ S	181°25′ E.
Karapiro	37°55′ S	175°32′ E.
Monowai	45°47′ S	167°37′ E.
Napier	39°30′ S	176°55′ W.
New Plymouth	39°04′ S	174°04′ E.
Raoul Island	29°15′ S	177°55′ E.
Rotorua	38°08′ S	176°15′ E.
Roxburgh	45°33′ S	169°20′ E.
Stratford	39°21′ S	174°17′ E.
Takaka	40°51′ S	172°48′ E.
Tuai	38°48′ S	177°09′ E.
Wairiri	43°30′ S	171°52′ E.
Wellington	41°17′ S	174°46′ E.
Onerahi	35°46.5′ S	174°22′ E.
Pacific Islands:		
Apia, Western Samoa	13°48′6″ S	171°46′30″ W.
Chatham Islands	43°57′ S	176°31′ W.
Guam, Mariana Islands	13°27′45″ N	144°43′29″ E.
Koror, West Caroline Islands	7°20.1′ N	134°29.1′ E.
Noumea, New Caledonia	22°18′10″ S	166°27′20″ E.
Papeete, Tahiti	17°32′ S	149°35′ W.
Pointe Molloy, Kerguelen	49°22′ S	70°04′ E.
Madang	05°14′ S	145°48′ E.
Port Moresby	9°24.5′ S	147°09.7′ E.
Rabaul, New Guinea	04°11′33″ S	152°10′16″ E.
Suva, Fiji	18°09′ S	178°27′ E.
Truk, East Caroline Islands	07°27′05″ N	151°51′15″ E.
ANTARCTIC		
South Pole		
Byrd	79°59.0′ S	120°00.5′ W.
Deception Island, Naval Base	62°59′ S	60°43′ W.
D'urville	66°40′ S	140°01′ E.
Hallett	72°25′ S	170°55′ E.
Halley Bay		
Mawson	67°35.7′ S	62°54.0′ E.
Mirny	66°33′ S	93°00′ E.
O'Higgins	63°19′ S	57°54′ W.
Scott Base	77°51′ S	166°48′ E.
Wilkes	66°15.5′ S	110°31.2′ E.

GLOSSARY

Acoustic waves.—The waves which contain sound energy; by the motion of these sound energy is transmitted in air, in water, or in the earth.

Amplitude.—The difference in height between the crests and the troughs of a wave or the maximum swing of the wave in one direction on a seismogram.

Aseismic.—Not subject to earthquakes. (Also called nonseismic.)

Asymmetry.—Lack of symmetry, without proper proportion of parts.

Attenuation.—Reduction in concentration, density, or energy.

Azimuth.—Direction; angle from.

Body waves.—Either longitudinal (P) or transverse (S) seismic waves transmitted in the interior of the earth.

Compressional wave=Longitudinal wave=Pressure wave=Primary wave=P-wave.—A traveling disturbance in an elastic medium characterized by volume changes (and hence density changes) and by particle motion in line with the direction of travel of the wave.

Coupling.—Connection or linking.

Damping.—A force opposing vibration which acts to decrease the amplitudes of successive free vibrations.

Degree.—The 360th part of a circle. A degree of latitude at the equator equals about 69 miles.

Dilatational source=Explosive source.—Wherein dilatational or pressure waves are originated by a deformation that is a change in volume, but not in shape.

Dilatational.—A first motion of a wave toward the source, as opposed to a compressional first motion which is away from the source.

Drum.—A rotating cylinder on a seismometer which moves the record paper at a regular speed.

Electromagnetic seismographs.—Instruments which use indirect recording; in these, the part of the instrument sensitive to ground movement can be placed some distance from the recording drum.

Epicenter.—The location on the earth's surface directly above the focus of an earthquake.

Erg.—A unit of energy.

Focus (of an earthquake).—The region of the origin.

Frequency (of a wave).—The number of crests which pass a fixed point every second.

Filter.—An electrical device in seismic instruments which permits selection of frequency characteristics appropriate for the ground motion it is desired to record.

HE.—High explosive (chemical rather than nuclear).

Hydrodynamic wave.—A type of surface seismic wave.

Kilometer.—A distance of 0.621 mile.

Kiloton.—1,000 tons.

L-wave.—A designation referring to surface waves without regard to type.

Long-period seismometer.—A seismometer with a time of pendulum swing of several seconds.

Longitudinal wave.—See compressional wave.

Magnitude (of an earthquake).—A quantity characterizing the total energy released by an earthquake.

Microbarographic instrument.—An instrument for recording small and rapid changes in atmospheric pressure.

Microseisms.—More or less persistent feeble earth tremors due to natural causes such as winds.

Nautical mile.—A measure equivalent to a minute of a great circle of the earth, or 6,076.1033 feet (1.15 miles).

Nonseismic area.—Not subject to earthquakes, aseismic area.

Parameter.—A quantity defining one of the conditions of a mathematical equation.

P-wave.—See compressional wave.

Period.—The time between the arrival of two successive crests of a wave.

Permafrost.—Permanently frozen ground.

Petrographically.—According to the systematic description and classification of rocks.

Pressure wave.—See compressional wave.

Primary wave.—P-wave, see compressional wave.

Radial fracture pattern.—A pattern of cracks which originate from a common center.

Rainier shot.—The underground nuclear explosion of 1.7 kilotons set off by the United States on September 19, 1957, at the Nevada test site.

S-wave.—See transverse wave.

Secondary wave.—S-wave, see transverse wave.

Seismic.—Pertaining to, characteristic of, or produced by earthquakes of earth vibration.

Seismic area.—An area in which earthquakes are frequent. Also refers to the area affected by any particular earthquake.

Seismoelectric effects.—Periodic changes in current between two electrodes inserted in the ground observed when a seismic wave passes between them.

Seismogram.—The record made by a seismograph.

Seismograph.—Instrument which records seismic (earthquake) waves.

Seismometer.—The motion-sensing component of a seismograph.

Shear wave.—See transverse wave.

Shear source.—An area of sliding displacement in the earth's crust.

Short-period seismometer.—A seismometer with a time of pendulum swing of a second or less which results in high magnifications of the signals received.

Sofar channel.—A region about 700 fathoms deep in the ocean where waves of relatively small energy are transmitted over very great distances.

Surface waves.—Waves which propagate along the earth's surface; L-waves.

Telluric currents.—Natural electric currents that flow on or near the earth's surface in large sheets.

Strata.—Sections of formations that consist throughout of approximately the same kind of rock material.

Transverse wave.—A wave in which particle motion of the medium is perpendicular to the direction of progression of the wave train. Also called S-wave, Secondary wave.

Vertical component seismograph.—A seismograph which is sensitive to up-and-down movements.

Sources used as a basis for these definitions:

American Geological Institute. Glossary of Geology and related sciences. Washington, D. C., 1957.

Eiby, G. A. About Earthquakes. New York, Harper & Bros., 1957. 168 pp.

LETTER OF SENATOR HUMPHREY TO SEISMOLOGISTS

APRIL 9, 1958.

DEAR ———: The Senate Subcommittee on Disarmament is engaged in a study of arms control measures which might be feasible at the present time. One of the proposals to which we are devoting attention is the suspension of nuclear weapons tests. A crucial issue concerns the kind of inspection system which would be necessary to assure that all parties were observing any test suspension agreement.

As you know, analysis of the data from seismic waves is a major method of detecting nuclear weapons tests. While the degree of certainty required for a detection system is a matter of political judgment, to make this judgment it is essential to have all the facts concerning the technical capability to detect tests. In order to obtain information on our technical capability to detect and identify underground explosions, the subcommittee is seeking the opinions of a number of seismologists. I would greatly appreciate it if you would answer the attached questionnaire and return it to me by May 1. The answers to these questions will be valuable to the Subcommittee on Disarmament as it proceeds with its study.

The subcommittee's tentative plan is to publish the information supplied by you and other seismologists, unless you have some reason why your comments should be kept confidential. In developing your answers, I would hope that they can be submitted in a form which is understandable to the lay person, and that they can be kept as concise as the nature of the question permits. Of course, any additional comments you wish to make will be of interest to us.

The subcommittee will appreciate deeply your assistance in this project.

Sincerely,

HUBERT H. HUMPHREY,
Chairman, Subcommittee on Disarmament.

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